



Vol. 64 No. 3 January 18, 1983 Transactions, American Geophysical Union



EOS, Transactions, American Geophysical Union

Vol. 64, No. 3, Pages 17-24

January 18, 196

Geodesy and Gravity

1810 Crustal Rowe-onta (Strains) APPLICATIONS OF DESORRATION ANALYSIS IN CLOSECY APPLICATION: OF DEFORMATION ANALYSIS IN CLOSES AND ENSIRABLES.

A. SECONDAM SET I. Livierates Uniques Condesse and Last Secondam I. Livierates Uniques Development of Theoretical Consecution of the role of deformation analysis in carried our with respect to its extering repeatable forum, applications in goodesy and geotypus libe forum, applications in goodesy and geotypus in the rate general case of Financian space, and specialized for Euclivean space, and the case of infinite-foru duformation, Arring the various deptitation; special employed by given to the study of createst deformation, arring the various deformation of the garding field and gravity field related deformation, other applications are also considered, e.g., earth tides, Latting Study, private repeatable resolute in ping, First tide. Secondam is restained to the gravity of tides, arthography, private repeatable resolute replications. (Secondam in the ping, gravity of tide).

Per. Geophys. Spice Phys., Paper 281568

Cierson Chiversity of Lagos, Lagos,

C. Clerson (Triversity of Lagos, tagos, Mileria).

Mr Cive here a cirect solution of this profess by converting, in an indirect way, the releasent integral equations over each bloc; to their equivalent line integrals taken along and around the boundary curves of the thock. Penits of sample consulations alson clearly compositate carries of the thock, Penits of eachie conjustions liver, clearly compensate the convergence and stability of these time integrals, we also computed geolatic transfers that to a 15° (30°) innor cone at 71 grid locations in Campron, using 17 a 4 monailes and integration stops of 10° for the four innermant, and 180° for the cent of the plocky-and conjunctions without the cat of the plocky-and conjunction without the cat of the cat of the city of the cat of the two in a 200, in max to - which reflect the four accuracy of the centre point me-that, effectably for 10 , 10 thacks hear Che confutation point.
J. technics. Res., Red. Paper 281495

Geomagnetism and Paleomagnetism

2520 Interactions between exterior sources and laterior properties (mappe total luric effects) INDUCTION OF CONCENTS IN LONG SUMMATINE CASLES BY HNUCTION OF CURRENTS IN LONG SUBMATINE CARLES BY MATURAL PHENOMENA
A Maloni, L. J. Leaverotti, (Sell Laboratories, Marry Mill, M.J. 07926); and G. P. Gregori
The influence of Thicked currents on long submarine cables has been observed for marry a century. The currents originate from time variations in the magacite field of external origin attons in the magacite field of external origin capabacies, atmospheric tides) and earth and cream tides. Steady martic chiracts of infarnal erigin hard also been prophese as an possible source. The indeped currents will depend upon the length, depth, and promispatic, location of the cables. Present understaining of the phanomena are reviewed. Also discussed are potablely scientific problems, which inch be addressed with scientific problems, which inch be addressed with

data from such long cables and possible limit-etions on the information obtained. Such problems include studies of (i) the deep conductivity structure of the Earth, (ii) talluric currents flowing in mid-oceanic ridges, (iii) the spatial extent of external source fields, and (iv) a possible role of electromagnetic eddy currents in fluctuations of the Earth's spin rate. (induction currents, telecommunications cables, magnetic variations).

currents, telecommunications cables, mag-variations), Rev. Geophys. Space Phys., Paper 281945

2530 Spatial Variations (all Harmonics and Anomalius)
TORE AND CROSSTAL GEOMAGNETIC FIELDS
L. A. Alldredge (U.S. Geological Survey, Oenver,
Colorado 80225)
The spherical harmonic content of fields from core
sources and extended crustal sources overlap as much
that very long wavelength anomalius obtained by
subtracting a core field model up to only degree 10
from the observations will be distorted so badly
that interpretation in terms of geological sources
will be very difficult.
J. Geombra, Rea., Sed. Pages 201678

J. Geophys. Res., Med. Paper 201579

2560 Time variations, palegosgnetime PRALEUMACHETIES OF CARBONIPEROUS INTRUSIONS IN

NORTH CARALINA

C. Barton (Septement of Geology and Geography, University of Massac, coutts. Ambers: Ma 01993) and 1. Brown Falconegactic admptos of two late Paleocote platans were collected from the vastern Pladmont Province in North Croffina, Assailed from the carrier Cathonifornia (326.27 m.y.) Litewellte platon, lucated in the Carolina State Soit, indicate apide position similar to that of the stall a Marth American craton for the lower Carbonifornia. Pive with a in this gathrufarantic complex Carboniformus. Five situs in this gabbus/granite complex sites a pole of 40°N, 184°F (alpha 95-2,9) The late Carboniformus (28145 a.y.) Churchiand pluton, located in the Charlotte Bell; given a pole of 34°N, 125°E the Charlotte Bolt, alves a pole of 38%, 126°g (tiple Wells, 1) which corrulates well with where Borth develops guide for the interferences, these poles for the interferences, the street for the corresponding to the content of the northern depole than a wastest stone Liveral displacement between the mid becoming and line Carbotiferans in the later Paleocair. This poleocages information from the constant Pledoon region implies that the area of the Carbotiferans for the Carbotiferan and Charlitte link two associated with the Borth Arorican platform for the ontire Carbotiferans period. The Slate Belt rocks, although geologically a souther counterpart to some of the Aritonian rocks from the northerntern regs of North Aperica, do not display a paleomagnati, highery suggestive of grout displayement.

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Hydrology

3130 Groundwater
CONTAMINANT TRANSPORT IN FRACTURED PORGUS MEDIA:
ANALYTICAL SOLUTIONS FOR A SYSTEM OF PARALLEL FRACTURES
E. A. Sudicky and E. O. Frind (Department of Earth
Sciences, University of Materioa, Materioa, Ontario,
N21, 361.)

Sciences, University of Materico, Materico, Unitarie, NZL 361.)

An exact analytical solution is developed for the problem of translent contaminant transport in discrete parallel fractures situated in a persons rock matrix. The solution takes into account advective transport in the fractures situated in a persons rock matrix. The solution takes into account advective transport in from the fracture axes, molecular diffusion from the fracture to the procus matrix, adsorption only the face of the matrix, adsorption within the matrix and radioactive decay. The general translent solution is into presented for the simpler problem that assuming Bauss-Legendre quadrature. A translent solution is also presented for the simpler problem that assuming lightle longitudinal dispersion along the fracture. This assumption is usually reasonable when the affective in large. A comparison between the standard continuing the significance of longitudinal dispersion in terms of the overall system response. Examples of the solutions demonstrate that pendirate distances along fractures can be substantially larger through multiple, closely-spead fractures that important the finite matrix to store solute.

Matax Assour, Baes, Papar 2MAA7

Heinz G. Stefan (St. Anthony Falls Hydraulic Lab, Univ. of Minnasota, Minneapolts, Minneapolts, Sinda, 554145, John J. Cardoni, Frank R. Schlobs and Charles E. Commission of total solar rediation and of photosynthatically active radiation (PAR) wavehead links water contribute high concentrations of very falls particles and/or phytoplankton is embysed. Reflectures of insident solar radiation on the same of the same water is also investigated. A ralation is developed to predict underwater tradiance as a plan phytoplankton models. Input variables consistincident solar radiation, suspended sediment, and chlorophyll—a concentrations. Data are from labe Chicot, Arkansas.

TITS BOLL BOLLEURE
STOCHAFTIC ANALYSIS OF CHE-DIMENSIONAL STRADY TO THE TION: A COMPARISON OF MONTE-CARLO AND RESTURBING

Inst. of Tech, 8-100 44 Stockholm, seeden) and qualification in the stockholm of woisture content; if Note that the stockholm of woisture content; if Note profile unders steady-state, unsaturated intil Frail is examined where the saturated hydraulic condent is taken as a stationary stockastic process. The farest tochsiques are semicyed in determining the stockastic output, These are sonice-Carle simulation and an analytic delivation from a fifter order years and an analytic delivation from a fifter order years turbettom solution. In comparing the two techniques is about the partnerset or appreciation of the partnerset or the partnerse and an analytic delivation from a first order of turbetton solution. In comparing the two teachings illability of the purhurbetton appropriate of the finding quant of the Monte-Carlo trigulbs are casumed. On the representation of the solution of the teaching obtained between the resultance has two montespecial analytic neutre of the people delivery good comparison obtained between the resultance has two montespecials and the solution of the s SEAN summary. Eruptive Activity An eruption in the E Rift Zone of Kilauea Volcano began at 0031 on 3 January. The outbreak began at Napau Crater, 14 km SE of the caldera rim. Fountaining and production of SE-moving lava flows of local extent continued until about 1000 and progressively extended the system of linear discontinuous vents downrift to the NE, for a distance of about 4 km. Following 21/4 hours of qui-escence, the eruption resumed at 1425

along a 100-m-long fissure at the NE (downrift) end of the vent system. This

eruption lasted nearly an hour. An esti-

mated $9-4 \times 10^6$ m³ of lava was extrud-

Kilauea Volcano, Hawaii, USA (19.42°N, 155.27°W). All times are local (GMT—10 hours). The following report was provided by the USGS Hawaiian Volcano Observatory.

Yews

Special Report

ed during this initial 101/2 hours of erup-The volcano remained quiet for nearly 2 days. At 1128 on 5 January the eruption resumed in the area active late 8 January. Here a vent system about 1 km ong erupted energetically but intermittently through the predawn hours of 9 January. Ten episodes of vigorous lava production occurred. They ranged in duration from 2 min to 18% hours. The volume erupted from these vents cannot be measured because most of the erupted lava poured into a gaping crack that

the N boundary of a prominent older During parts of 7 and 8 January, the main eruptive center shifted temporarily to vents located another km or so downrift. These vents erupted strongly from 1030 to 1557 on 7 January, producing a flow nearly 6 km long that extended E then turned SE. The flow, which covered about 1 × 106 m2, turned to an roughly 1 km from the vents and stopped nearly 5 km from the coast. A second, less voluminous eruption from the same vents from 1625 on 7 January to 0430 on January 8 produced a smaller lava flow that everyode the proximal end of the first

Since early 9 January, the eruption has consisted of intermittent weak fountaining and minor lava flow production from vents about 1 km uprift from the 7-8 January activity.

Seismicity and Deformation

In the weeks prior to the eruption, seismographs recorded increasing rates of microearthquakes in the E Rift of Kilauea. At 0030 on 2 January the seismic-

Tropical Cyclones: Their

Evolution, Structure, and

R. A. Anthes, Meleorol. Monogr., vol. 19, no.

41. American Meteorological Society, Boston, Mass., xvii + 208 pp., 1982, \$40.00.

This book gives the state of knowledge

about tropical cyclones. After the introduc-

tance of these phenomena, the reader be-

most powerful perturbations of the atmo-

sphere. All the aspects of the phenomenon

ed to the interaction between storm and

are treated. Thus, an entire chapter is devot-

The introduction begins with some history about the first descriptions and understand-

ing of tropical cyclones. It is followed by their

socioeconomic impact. Their influence can be

20,000 deaths and economic loss of \$6-7 bil-

the structure and life cycle of cyclones. This

knowledge has emerged mainly after World

War II and followed the implementation of

upper-air stations and from the flights of in-

strumented aircraft. On the basis of figures

taken from different papers, the structure of

tropical storms appears clearly. The author

which is one of the most striking features of

the phenomenon. The role of different pa-

rameters in cyclogenesis is largely discussed.

tries to explain the formation of the eye,

In the second chapter, the author describes

illustrated with numbers taken from the

book: Each year an average number of

tion, which stresses the socioeconomic impor-

comes excited to know more about one of the

Effects

Reviewed by D. Cadet

eruptive activity resumed once again at 1425 and abated an hour later when the eruptive activity ended. Weak harmonic tremor continued for over a day. From late 4 January, as the tilt pattern reversed from inflation to deflation, small earthquakes and harmonic tremor gradually increased near the eruptive fisdeveloped a few hundred m to the SE, at

sures. By 0500 on 5 January the seismicity had increased noticeably, and [it] continued to increase until lava fountaining resumed at midday. Tremor levels remained generally high during the eruptive episodes from 5-9 January, with amplitudes peaking during strong fountaining and diminishing during low activity. The maximum tremor amplitudes recorded were from 1200 to 1600 on 7 January, coincident with the high rate of lava production that fed the 6 km flow

that advanced toward the coast.

ity developed into a swarm of small

earthquakes and weak harmonic tremor.

The activity started near Mauna Ulu

(about 9 km from the caldera rim), in-

creased in the early hours, and migrated

intensity peaked between 0040 and 0110,

when several earthquakes, 2.5 to 3.0 in

magnitude, were felt in the Hawaii Vol-

canoes National Park area. Tiltmeters re-

creasing significantly at 1300. From 0300 to 1300 the seismic zone spread several

km downrift. For nearly 10 hours there-

after, and up to the time of eruption,

small earthquakes accompanied by har-

monic tremor occurred at a nearly con-

stant rate, mainly along a 8-km-long zone

extending downrift from Napau Crater.

crew, and seismographs started to record

increasing amplitudes of harmonic trem-

or and constant deflation of the summit.

At 1002, when the first episode of foun-

tremor continued, tiny earthquakes E of

Napau increased. Tremor increased as

taining ended, tremor amplitudes de-

creased, deflation stopped, and rapid

reinflation started. As low amplitude

At 0031 on 3 January the eruption was

sighted at Napau Crater by a ground

corded slow deflation of the summit

commencing at 0100, with the rate in-

downrift about 9 km to beyond Napau Grater. Tiny earthquakes were recorded at a rate of 3 to 5 per min. The seismic

Geoelectric and recorded tilt changes on 3 January strongly suggested that magma was intruding the E Rift Zone to about 3 km downrift from the vents active at that time. However, observations of ground cracking, tilt measurements, and electronic distance measurements showed that the major extension perpen dicular to the rift zone occurred N and NE of that area late on 6 January and

during 7 January.

As of 10 January the eruption was still in progress, though extrusive activity had diminished in vigor. Accelerated collapse of the summit had ended on 8 January and on 10 January, tiltmeters showed

After this description, the physical processes are exposed. Tropical cyclones are sus-

tained with the large amount of latent heat released in intense convection. As convection

depends mainly on eddy transfers of heat,

moisture, and momentum at the sea surface, processes occurring in the boundary layer are

described. Large amounts of water vapor are

supplied to cumulus convection: Frictionally uced convergence of water vapor is about

2-5 times the water vapor released through

evaporation. The author points out that al-

mary source for hurricanes has been recog-

nized for a long time, the details of how la-

environment and the clouds is discussed as

well as cumulus parameterization schemes.

The differential radiative cooling which may

play an important role in the early stages of a

Chapter 4 is devoted to numerical model-

storm's development is finally described.

ings. First efforts begun during the 1960s

with the development of axisymmetric (two-dimensional) models. Although the under-

standing of tropical cyclones was largely im-

storms because they were uncapable of treat-

ing asymmetric effects and the interaction.

with the environment. The introduction of

Kuo's cumulus parameterization scheme was

models. One of the problems of three-dimen-

sional modeling is due to the different scales

needed to represent the different parts of a

storm. Near the eye, a fine mesh grid is nec-

essary, whereas outside, a coarser mesh grid

models is for operational purpose, and the initialization with observed data is important.

Some of the tables found in this chapter are

can be used. The major objective of these

important in the development of successful

proved, they were not suitable to model

tent heating produces the genesis are still not well known. The interaction between the

though condensation of water vapor as a pri-

only minor summit deflation. An estimated 45 × 106 m³ of magma had drained from the summit storage system. Harmonic tremor was strong, although somewhat below the amplitudes during periods of vigorous lava production. Frequency of shallow earthquakes in the rift zone had declined, and this indicated that no major migration of the dike system was in progress.

Information contacts: Edward Wolfe, Arnold Okamura, and Robert Koyanagi, USGS Hawaiian Volcano Observatory, Hawaii Volcanoes National Park, Hawaii 96718 USA.

IGY Commemorated

Resolved, That the House of Representatives commemorates the 25th Anniversary of the beginning of the International Geophysi-cal Year [IGY], and reaffirms the commitment of the House of Representatives to

a new, vigorous era of international cooperation all the sciences. The House of Representatives unanimously

passed this resolution, H.R. 514, just before the close of the 97th Congress. The resolu-tion mentions just a fraction of the scientific advancements achieved during the 18-month period of IGY.' Tim Wirth (D.-Colo.) told colleagues in the House. He introduced the resolution last June and testified before the House Science and Technology Committee on behalf of the resolution (Eas, August 24, 1982, p. 617).
'Aside from the marvel of launching artifi-

cial space satellites and the intensive exploration of our planet, IGY brought a continuing flow of important scientific knowledge to our society. Wirth said, 'IGY's remarkable accomplishments have led to societal improvements we now take for granted, such as refined methods of weather prediction and space ex-ploration. In addition, IGY has had a lasting beneficial impact on cooperative scientific programs—a global network of the world's finesi scientists know each other and continue to work together."

Reaffirmation of the House's commitment to international scientific cooperation in the future, the second part of the unanimously approved resolution, could portend more holehearted support for science funding. The 98th Congress will begin work on the fiscal 1984 budget next week when President Reagan is scheduled to send his budget proposal to Capitol Hill. In mid February, Eas will publish an analysis of the President's budget as it relates to geophysics and earth

Wirth explained why he included the reaffirmation in the resolution: 'We need to reaf-

of considerable interest because they give a

dreamed to modify hurricanes. The first

seeding was performed in 1947, and the ma-

jor program was the project STORMFURY.

shows that seeding seems to reduce the inten-

sity of tropical storms. However, the number

of experiments is too small to be statistically significant. Numerical models are also used to

test the hypothesis. It must be noted that the

author's opinion is that the impact of seeding

In the first part of chapter 6, the interac-

tion between storm and ocean are examined.

The most observable effect is the decrease of

SST after the passage of a storm due to up-welling and mixing. Linear and nonlinear

models of oceanic responses are described.

Tropical cyclones are deadly phenomena be-

cause of surges occurring during landfall over low-lying areas. This question is treated

of forecasting which is the main objective of research. The author reviews the different

methods based on statistical and dynamical models. In the first category, it is noteworthy

that even a simple model compares favorably

with more complicated models. It is striking

that although the understanding and model-ing of hurricanes have largely progressed

ropical storm position errors for 24-hour

forecast between 1953 and 1966 is only 10-

12% (similar trend prevails for the period -

1967 to present). However, this conclusion must be tempered by the fact that the popul

lation of cyclones is not the same for differ-

during the last 20 years, the redu

The last chapter is devoted to the question

in the last part of the chapter.

is minimal when compared with natural

There is some experimental evidence that

ization schemes they used.

changes in the storm.

complete list of models as well as parameter

For a long time, some meteorologists have

firm our commitment to a new era of peaceful international cooperation in the sciences. My resolution reassirms our commitment despite signals from the Reagan administration that it is willing to diminish our participation in international science programs. Our nation cannot afford such a participation cannot afford such a retreat, and I fear our world cannot long survive in an atmosphere of conflict instead of cooperation.

The complete text of H.R. 514 appears in the December 21, 1982, Congressional Rec-

Field Studies Courses Open

Fourteen month-long courses combining applied academics with training in field research methodology are being offered this summer by the School for Field Studies. The courses, held in eight countries during May. June, July, and August, provide unique op-portunities for participants to work as a team under primitive conditions.

'Our courses bind together the academic challenge of the research problem, the physical challenge of the site itself, and the interpersonal challenge of the expedition team in dynamic way so that both cognitive and affective learning are accelerated, according to Jim Elder, the school's director.

The courses to be offered this year are explosive volcanism (in Landmannalaugar, Iceland); environmental geology (Landmannalaugar, Iceland); community ecology (Mount St. Helens National Monument, Washington); limnology and acid rain (Adirondack Mountains, New York); marine manunal biology and conservation (Glacier Bay, Alaska); wildlife management (Athi Plains, Kenya); wildlife resource selection (Athi Plains, Kenya); population dynamics of endangered species (Theodorou, Crete); ecosystem management (Canyonlands National Park, Utah); alpine plant ecology and land use (Obergurgl, Austria, and Davos, Switzerland); ecology and national park planning (Atacama Desert, Chile); arctic botany (Brooks Range, Alaska); cetacean behavioral ecology (Gulf of Maine); and cotal reef ecology (St. John, U.S. Virgin Is-

Many students receive academic credit for the courses taken with the School for Field Studies; each month-long field course is nearly equivalent to a full-semester college course. Affiliation agreements with several northeastern universities are being negotiated to facili-tate the awarding of credit.

Applications for 1983 courses are being accepted and will be reviewed on February I. March I, and April I to fill expedition teams, which will average 12 students and two facul-ty leaders each. For additional information, contact the School for Field Studies, Room 201, 50 Western Avenue, Cambridge, MA 02139 (telephone: 617-497-9000, ext. 212).

ISBN 0-87590-053-4

Geophysical Monograph 27

The Tectonic and Geologic Evolution of Southeast Asian Seas and Islands:

Part 2 (1983) Dennis E. Hayes, Editor

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price G.M. 23 The Tectonic and Geologic Evolution of Southgast Asian Seas and Islands (1980), D.E. Hayes editor. list pilco \$32., member price \$22,40; Order both Volumes for only \$49. (Illa price \$66.)

0 American Geophysical Union 2000 Florida Avenue, N.W. Washington, D.C. 20009

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ent years. Another parameter that is more important is the landfall position: During the 1970s, the average error was only 39 nm. The author points out that improvement will come from a better knowledge of initial conditions and development of better parameter-

ization schemes to represent physical process-

This book is very valuable to anybody interested in tropical cyclones. The only major shortcoming is that it contains no presentation of the impact of satellite information on the understanding and forecasting of tropical

D. Cadet is with the Department of Meteorology, Florida State University, Tallahassee, Florida.

Numerical Solution of Partial Differential Equations in Science and Engineering

L. Lapidus and G. F. Pinder, Wiley-Interscience, New York, 677 pp., 1982, \$44.95.

Reviewed by Herbert F. Wang

The book by Lapidus and Pinder is a very comprehensive, even exhaustive, survey of the subject. The dust jacket accurately labels the book as a reference/text. In the first three chapters a brief introduction is given to the terminology of partial differential equations followed by a very good description of the basic concepts of finite difference and finite element techniques. The final three chapters deal individually with parabolic, elliptic, and hyperbolic equations. The book is unique in that it covers equally finite difference and finite element methods. Smaller coverage is given to collocation and boundary element

The book is a universal treatment of numerical methods. Discipline-oriented treatments also exist. For example, Pinder is coauthor of Fruite Element Simulation in Surface and Subsurface Hydrology.

The authors emphasize model equations, i.e., $u_x = u_{xx}$, $u_{xx} + u_{xy} = 0$, $u_x + bu_y = 0$, where the subscripts indicate partial derivatives, in order to discuss solution techniques, convergence, and stability. Thus, if one needs to choose between ADI, LSOR, LOD, etc., to solve one's particular problem, then here is the source to find a discussion and compari-

son of the techniques. The book is written clearly enough. The text is laden with equations as might be ex-pected. A nice feature of the book is the clear illustrations that show computational schemes or finite element basis functions. It is relatively clean of mistakes, although the running head is incorrect for twenty pages and a few typos exist. Sometimes, notation is not quite consistent or adequately explained. Some direct repetition occurs. For example, the finite difference formula for irregularly spaced grid points is given once in chapter 2 and again in chapter 5. Indirect repetition occurs

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when certain developments in finite difference or finite element methodology are used in the context of different equations. The sheer tediousness of analyzing many specialized methods occasionally strikes the authors also and so we find (p. 417) 'We could finally turn to an analysis of the SSOR, USSOR, MSOR. . . . methods. However, this goes be-

yond our durability. . . . Mathematics, even what is called applied mathematics, tends to be more abstract than meets the interests or needs of the scientist or engineer. That the authors of a book on numerical solutions of partial differential equations should be in the fields of chemical engineering and hydrology, respectively, reflects the trend that the numerical methods texts are being written by those who actually carry problems through to a solution. However. this text is still an important practical step away from the solution to a problem. The finite difference or finite element theory needs to be coded into a computer program, a step that is not treated in this book or in most

books of its genus. Despite the awesome scope of the book. feel that it could have been whittled down some. At many points the discussion becomes a summary of papers in the literature. The book could use, to coin a phrase, one more iteration. Right now the book probably serves its reference function better than its text function. The book is an especially valuable resource for its treatment of the finite element method as a numerical technique for the solution of partial differential equations.

Herbert F. Wang is with the Department of Geology and Geophysics, University of Wisconsin, Madison, Wisconsin.

Thermodynamics of Minerals and Melts

R. C. Newton, A. Navrotsky, and B. J. Wood (Eds.), Adv. in Phys. Geochem., vol. 1, Springer-Verlag, New York, xii + 304 pp., 1981,

Reviewed by Douglas Rumble

The book, Thermodynamics of Minerals and Melts, edited by R. C. Newton, A. Navrotsky, and B. J. Wood, is volume 1 in the series Advances in Physical Geochemistry, with S. K. Saxena as series editor. The volume is divided into three parts: (1) general principles, (2) thermodynamic analysis of mineral systems, and (3) thermodynamics of melt systems. Par I had one paper on the derivation of J. Willard Gibbs' mathematical formulation of the combined first and second laws of thermodynamics for an open system by G. Tunell. Par 2 covers the following topics, listed with authors: thermodynamics of devolatilization reactions (T. J. B. Holland), 'lambda' transitions in minerals (A. B. Thompson and E. H. Perkins), crystal-field effects on thermodynamic properties of iron-bearing minerals (B. J. Wood), stable isotope geothermometry (R. N. Clayton), calculation of thermodynamic prop-

Earth Sciences/University of Leeds. Applications are invited for two positions available from 1 Octo-

ber 1983.

The appointee to the Lectureship in Chemical Oceauography or Sedimentary Geochemistry would preferably
have interests in interactions between sediments and
natural waters, Facilities exist for elemental and isotopic analyses of sea water and particulate matter.
The Department is also arrive in related areas of
sedimentology, isotope geology, sedimentary ore deposits, theoretical petrology and a range of analytical geochemistry.

ostata treatment al geochemistry.

The appointee to the Lectureship in Geophysics could have qualifications and interests in any branch of exploration geophysics or solid earth geophysics. Present activities in these areas include exploration present activities in these areas include exploration and selections are selected exploration.

mology, global seismology and seismicity, palaec gnetism, tectonophysics, gravity and magnetics i electrical methods.

The Department of Earth Sciences is an integrat-

ed geology-geochemistry-solidearth geophysics de-partment teaching MSc in Geochemistry and Geo-physics as well as undergraduates, and with a re-

hysics as well as undergraduates, and with a re-earch school of 30+ audents.

Salary on the scale of £6375-£13,505 according to age, qualifications and experience.
Application forms (not essential) and further particulars may be obtained from the Registrar, University of Leeds, Leeds LS2 9JT, West Yorkshire, UK.

Closing date 1 March 1983 (by telegram in the first instance if necessary for candidates outside the UK).

Isotope Geologiat/University of Wyoming. The Department of Geology/Geophysics invites applications for a tenure track position at the assistant professor level in isotope geology. The applicant's field of specialty may be stable or radiogenic isotopes. The successful candidate will be expected to teach undergraduate and graduate courses and conduct his/her own research program.

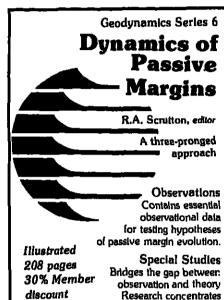
Gurrent research at the University of Wyoming includes: crustal evolution in the Archean and Proterozoic; the systematics of magma contamination; carbonate diagenesis; fluid-rock interaction; and the tectonic evolution of compressional and extensional orogenic belts. We hope the successful candidate will complement these studies as well as develop a strong, independent program. Applicants should submit a vita, transcripts, a letter describing future research interests, and names of three references to Dr. Robert S. Hottston, Head, Dept. of Geology/Geophysics, PO Box 5008, University Sation, University Sation, University Sation, University Sation, University of Wyoming, Laramie, WY:32071. Closing date for applications is February 28, 1983.

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erties of minerals from natural parageneses (L. L. Perchuk, K. K. Podlesskii, and L. Y. Aranovich), thermodynamics of the garnetplagioclase-Al₂O₃-quariz geobaroineter (R. C. Newton and H. T. Haselton), and thermodynamics of diopside and enstatite solid solutions (D. H. Lindsley, T. E. Grover, and P. M.

Part 3 contains papers on thermodynamics of molten salt mixtures (O. J. Kleppa), ther-modynamics of mixing in silicate glasses and melts (A. Navrotsky), thermodynamic modeling of silicate melts (Y. Bottinga, D. F. Weill, and P. Richet), calculation of silicate mineralmelt phase diagrams (C. H. Langmuir and G. N. Hanson), and volatile interactions in nagmas (J. R. Holloway).

The contributions cover a very wide range of the thermodynamic principles and methods currently being used in research on minerals and melts. For nonthermodynamicians, the book will provide an exciting overview of the capabilities and potential of thermodynamics for solving geologic problems. The papers in the volume are sufficiently detailed. nowever, that those interested in using thermodynamics in their own research will find them useful.



\$20.00

on one characteristi common to a numbe of margins as it appears worldwide Mechanisms Investigates proposed mechanisms for the evolution of passive margins those based on stress and those based on

thermal factors The interrelationship between passive margins and continental interiors is also explored

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Faculty Position in Oceanography/University of Miami. Applications are invited for a tenured-earning faculty appointment in physical occatnography; level of appointment and salary commensurate with qualifications. Applicants should have a record of scholarly publications demonstrating the ability to interpret oceanographic observations, and several years experience in planning and executions of oceanographic field experiments. Dutles include teaching graduate level courses in physical oceanography and supervising research of graduate students. Send curriculum vitae, publication list and names of three references to: Dr. Friedrich Schott, Chairman, Division of Meteorology and Physical Oceanography, Rosenstiel School of Marine and Atmospheric Science, University of Miami, 1600 Rickenbacker Causeway, Miami, Forida 33149.

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University of Kentucky/Department of Geology. The Department of Geology invites applications for two tenured track Assistant Professor level positions, Both appointments are for soft rock geologists preferably with some experience in industry and interests including one of the following: sedimentology, stratigraphy, carbonate petrology, organic geochemistry, or isotope geology. The successful applicants would be required to participate in active research, supervise graduate students and teach graduates and undergraduates. Familiarity with quantitative techniques is desired; Department has access to a variety of computational devices. Academic viae and names of three references should be sent to Dr. Lyle Sendlein, Chairman, Search Committee, 321 Patterson Office Tower, University of Kentucky, Lexington, Kentucky 40508-0027. Closing date is March 1, 1983. Both appointments are to commence in August 1983, but an carlier date may be considered. Salary is negotiable.

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Faculty positions/University of Texas at Arlington. The Dept. of Geology invites applications for a tenure-track or tenured position in carbonate petrology and sedimentology, and also a tenure track position in patrology, both beginning Fall 1983. A PhD and demonstrated research ability are required. Applications with resume and statement of interest should be sent by Pebruary 1.5 to Dr. C. I. Smith, Department of Geology, University of Texas at Arlington, P.O. Box 19049, Arlington, Texas at Arlington, P.O. Box 19049, Arlington, Texas 76019. Letters of recommendation should be requested of three persons who are well acquainted with the applicant.

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The level of presentation is appropriate for graduate students in mineralogy, petrology, and geochemistry; however, the work is not a systematic textbook. Certain papers, such 28 that by G. Tunell, should be required reading for students in a general course of physical geochemistry. Many of the other contributions would be very useful as supplementary references in more specialized courses.

A comparison of the papers on minerals with those on melts gives a clear picture of the current status of research. In thermodynamic work on mineral solid solutions, it is virtually taken for granted that crystal structure and crystal chemical data are available. For this reason, configurational entropy can be calculated for minerals with minimal ambiguity. Research attention is focused on the problem of modeling deviations from ideal

The status of thermodynamics with respect to silicate melts is quite different because it is so much more difficult to deduce the structure of melts than of crystals. The basic problem in the thermodynamics of melts is to de termine the structure of melt species and their statistical distribution. Many of the papers on melts in the volume are concerned with choosing a model for calculating configurational entropy. There is not sufficient experimental evidence available, however, to support a definite choice between competing models. Those who are engaged in the task of measuring structural properties of silicate melts deserve the cothusiastic and sympathet ic support of the test of us, for the research of all netrologists will benefit from new insight into the structure of mehs.

Douglas Rumble is with the Geophysical Laboratory, Washington, D.C.

New Publications

Items listed in New Publications can be ordered directly from the publisher; they are not available through AGU.

Gravity, C. Tsubri, George Allen & Unwin, Boston, xiv + 254 pp., 1983, hardbound \$40.00, doth \$19.95.

Igneous Rucks, D. S. Barker, Prentice-Hall; Emglewood Clitts, N.J., xii + 417 pp., 1983. Inguetospheric Plasma Physics, A. Nishida (F.d.), Dev. in Earth and Planet Sci., vol. 4. D. Reidel, Hingham, Mass., xii + 348 pp., \$49.50.

Underground Storage of Oil and Gas in Salt De posits and Other Non-Hard Rocks, W. Dreyer, Geol. of Petrol., vol. 4, John Wiley, New York, vi + 207 pp., 1982. Problem 81, P. R. Simpson, J. A. Plant, and G. C. Brown (Eds.), The Mineralogical Society, London, 216 pp., 1982, \$37.50.

First Announcement International Symposium on Deep Structure of The Continental Crust: Results from Reflection Seismology

The conference will be held during June 26, 27, 28, 1984, on the Cornell University campus in Ithaca, New York. The technical sessions will cover, amongst others, the ioliowing topics:

-Plesuits of seismic reflection profiling of the deep continental crust in countries throughout the world. -Structure of orogenic belts.

—Structure of continental rifts. ure oi ine -Mechanisms of continental accre-

-State-of-the-art techniques in deep seismic reflection profiling.

A comprehensive proceedings of the conerence will be published.

Steering Committee of the conference: -Muawia Barazangi, Coordinator Department of Geological Sci-Comeil University

Ithaoa, New York 14853 Telephone: (607) 258-6411 Telex No: 937478 —Albert Bally (Rice University) -Robert Hamilton (U.S. Geological Survey)

-Leonard Johnson (U.S. National Sci ence Foundation) -Robert Phinney (Princeton University -- Donald Turcoite (Comell University)

For additional information concerning su mission of abetracts and/or to attend the conference please contact the Coordin Participation may be limited.

Research Positions/Lunar and Planetary Laboratory. The Lunar and Planetary Laboratory at the ry. Ane Lunar and Fianciary Laboratory at the University of Arizona has research positions open for Planetary Scientists, with Planetary Astronomy and Planetary Geology being areas of greatest inter-est to the Laboratory at this time. Researchers at the boratory have access to the University's observa-Laboratory wide range of astronomical instrumenta-tion, a complete collection of planetary images, com-puters and laboratory facilities. The research ranks in the Laboratory, namely Assistant Planetary Scien-tist, Associate Planetary Scientist, and Planetary Sci-entist parallel the tenure track ranks of Assistant, Associate and Full Professor. The Laboratory is in-percued in making appointments at the Assistant or terested in making appointments at the Assistant or Associate Planetary Scientist level. These are not Associate Planetary Scientist level. These are not tenurable and not state-funded positions. Salary levels are commensurate with equivalent tenure-track ranks. Researchers in these positions will be expected to supply a significant portion of all of their salaries through their grants and contracts.

Applicants should submit a curriculum vita, list of publications, and the names of three references by April 30, 1983, to L. L. Wilkening, Director, Lunar and Planetary Laboratory, University of Arizona, Tucson, Arizona, 85721.

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Send double-spaced manuscripts (four copies) to Eos, AGU, 2000 Florida Avenue, N.W., Washington, D.C. 20009, or send them directly to one of the associate editors with a copy to the above

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Ess, Transactions, American Geophysical Union (ISSN 0096-3041) is published weekly by the American Geophysical Union from 2000 Florida Avenue, N.W., Washington, D.C. 20009, Sub-scription price to members is included in annua dues (\$20.00 per year). Information on institudues (\$20.00 per year), fritormated on institu-tional subscriptions is available on request. This issue \$5,00. Second-class postage paid at Wash-ington, D.C., and at additional mailing offices.

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Cover. The El Asnam, Algeria, earthquake of October 10, 1980, with a surface wave magnitude (M_s) of 7.3, produced nu merous surface fractures and large dislacement fields as a result of faulting. The 3-D computer plot displays the theoretical displacement field (vertical exaggeration 5000x) caused by a complex Volerra dislocation. On the right is a dip-slip reverse fault with a rupture length of 32 km and a maximum vertical displacement (Δμ) of 3.50 m. There are 12 segmented faults in this figure; five of them are reverse dip-slip with a 60° dip and an average strike of N45°E. The other seven aults are secondary normal faults with either a N45°E or N53°W trend. The area of secondary faulting was complex; in some places, left-lateral strike-slip motion as measured. The short-period P ways focal mechanism solution has a preferred nodal plane at N42°E with a dip of 60°W, which has been constrained with the S wave polarization obtained at several critical seismological stations in Africa. (Submitted by A. F. Espinosa, U.S. Geological Survey, Office of Earthquake Studies, Denver, Colorado.)

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Faculty Position/Princeton University Department of Geological and Geophysical Sciences. We are looking for an exceptionally creative individual in the general area of paleomology—stratigraphy—sedimentology for tenure-track appointment as Assistant Professor. Rapid increases in understanding of the processes and history of the earth's surficial environment have come about through analytical and theoretical advances in many specialities, such as magnetic stratigraphy, clay mineralogy and geochemistry, seismic stratigraphy, isotopic and microanalytical studies of fossily and sediments, sedimentation related to crustal tectories, and mahomatical tation related to crustal tectorics, and mathematical analysis of stratigraphic and paleontological data. We seek candidates with strong interdisciplinary rewe seek candidates with strong interrisciplinary re-search interests in areas such as those listed, with the analytical skills and foresight to work effectively on the frontier. Within the department, the appoin-tee should be able to take responsibility for an area such as stratigraphy, paleontology, or sedimentol-ogy, and provide a broad historical perspective. We plan to back up this appointment by our program for a general expansion of laboratory facilities, as appropriate.

appropriate.
Inquiries should be made to: R. A. Phinney, chairman, at the above address, or by phone, (609) 452-1100. While later applications will be considered, we would like to have them by the \$1st of January, 1985, or earlier, if possible. Applicants should submit: resume, names of at least three references, and a statement of research plans and priorities.

Princeton University is an equal opportunity affirmative action employer.

Department Head/Physics and Atmospheric Science, Drexel University. Drexel University seeks an outstanding individual to be Head of the Department of Physics and Atmospheric Science heginning Fall, 1983. Applicants should have extensive research/teaching experience and should have demonstrated appropriate leadership ability. The applicant will be concurrently a Full Professor with tenure.

Drexel is a private, technological University with an enrollment of 10,000, most of whom participate in a unique cooperative program. It is located in the West Philadelphia Community of University City, in close proximity to two other educational institutions and a trajer science center. The Department of Physics and Atmospheric Science has 30 faculty, plus an average of five visitors per year, and 40 graduate and 60 univergiaduate students. There is significant research activity in three major areas: Experimental Physics (biophysics, nuclear physics, quantum opics, solar energy, solid state physics). Theoretical Physics (atomic and molecular physics, biomathematics, muchematical physics, nonlinear dynamics, muchear physics, quantum opics, solid state physics) and Atmospheric Science (mesometeorology, remote serving of the atmosphere and satellite ineteorology). Funding for these research state physics) and Atmospheric Science interone-teorology, remote sensing of the atmosphere and satellite meteorology). Fullian for these research activities exceeds one million dollars per year. Screening of applicants will begin on March 15, 1983. Nominations or inquiries should be directed

Dr. T. K. Lim, Chairperson Departmental Head Search Committee Department of Physics and Annospheric Science Dréxel Universit

Philadelphia, PA 19104
(211) 895-2717
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Postdoctoral Positions in Planetary Studies. The Laboratory for Atmospheric and Space Physics at the University of Colonado has openings for two postdoctoral appointments. One appointment will be for study of Voyager observations of planetary rings. The other appointment will be in the field of rings. The other appointment will be in the field of plattetary atmospheres: aerottomy, radiative transfer, and cloud chemistry and microphysics. The Lakontory for Atmospheric and Space Physics is involved with the acquisition, analysis, and understanding of spacecraft ubservations of solar system objects. Current active missions include Voyager. Floncer Venus, and Galileo. Applications are invited from graduating students and recent graduates with experience in one or more of the above areas. The term of appointment is for one year with possible renewal on a yearly basis; the starting salary is approximately \$1900 per month.

Send letter of application, resume and names of two references by April 15, 1985 to:

Prof. C. A. Barth
Laboratory for Atmospheric and
Space Physics
Campus Box 392
University of Colorado
Boulder, CO 80309
The University of Colorado
Boulder, CO 60509

Faculty Positions/The University of Iowa. The Department of Physics and Astronomy anticipates one or two openings for tenure-track assistant professors or visiting professors of any rank in August 1983. Preference will be given to experimentalists in any area for the tenure-track positions. Current research interests include astronomy, atomic, condensed matter, elementary particle, laser, nuclear, plasma, and space physics. The positions involve undergraduate and graduate teaching, guidance of research students, and personal research. Interested persons should send a résumé and a statement of research interests, and have three letters of recommendation sent to Search Committee, Department of Physics and Astronomy, The University of Iowa, Iowa Cib., IA 322-12.

City, 1A 52242.

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Postdoctoral Fellowships in Experimental Geology or Geophyalca/Harvard University. Each year Harvard University offers one or more postdectoral research fellowships in experimental geology or geophysics. Awards are for one year, normally renewable for a second year; stipends vary depending on the research field and the experience of the candidate, but \$20,000 is typical. Interested applicants should send a resume and a statement of proposed research and arrange for at least 2 letters of reference to be sent to the Chairman, Department of Geological Sciences, Harvard University, Cambridge, Massachusetts 02138.

Deadline for the 1983–1984 academic year is April 30, 1983.

April 30, 1983.
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Position in Petrology/Rice University, Houston, Texas.

The Department of Geology has a tenure-track opening beginning July 1985 with starting level of appointment depending on the experience of the candidate. The faculty member is expected to establish, or continue a vigorous research program in petrology and to participate in teaching in mineralogy-petrology, Research areas in which we are potentially interested include: igneous petrology, metamorphic petrology, ore deposition, experimental petrology, interactions of fluids with rocks and sediments, isotope geochemistry, but other specialties are not excluded from consideration. Available research facilities of the Department include: electron-microprobe, ICP-spectrograph, Ar-Ar dating, and stable light isotope mass-spectrometry. Send curriculum vitae, a statement of planned research, and names of at least three references to Dr. A. W. Bally, Chairman, Department of Geology, Rice University, P.O. Box 1892; Houston, Texas 77251.

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Assistant or Associate Professor/CSM. The Geology Department of the Colorado School of Mines invites applications for a faculty position commencing September 1, 1988 as Assistant or Associate Professor of Geology in the specialty of Paleontology and Sedimentary Geology to teach courses at the undergraduate and graduate levels, direct theses and conduct research in these areas. The Ph.D. degree is required. Share is dependent through the professor.

quired. Salary is dependent upon experience.
The deadline for applications is April 15, 1989.
Resumes and references should be mailed to: Dr.
J. Finney; Head, Geology Department; Colorado School of Mines; Golden, Colorado 80401.
Colorado School of Mines is an Alfirmative Action. Equal Opportunity Employee. tion, Equal Opportunity Employer.

Atmospheric Chemistry & Aeronomy Division (ACAD) and Scientific Computing Division (SCD)/Ph.D. Scientist I or II. The National Center for Atmospheric Research in Boulder, CO is seeking a scientist to establish and manage the scientific research in Incuherent Scatter Radar data base. Will interact with user and radar community to establish retreated project to insure a proportion scientific research project to insure a proportion of the project to th interact with user and radar community to establish research project to insure appropriate scientific use of data base. Position requirements include Ph.D. degree or equivalent, research experience in aeronomy physics, electronic engineering, aumospheric science, or closely related field. Familiarity with the Incoherent Scatter Radar techniques for measuring the properties of the ionosphere, magnetosphere, and atmosphere. Demonstrated high level of skills in advanced FORTRAN programming, numerical and atmosphere. Demonstrated high level of skills in advanced FORTRAN programming, mmerical modeling data reduction techniques, flevel III) requires national scientific recognition and demonstrated leadership skills in and promoting Incoherent Scatter Radar research. This is a term position subject to annual review and continued funding for project. Send resume PROMPTLY to Esther Blazon, NCAR, P.O. Box 3000, Boulder, CO 80307 or call 303-494-5151 est. 581 got information.

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Research Physicists in ionospherie/Magnetospherie Physics. Two professional level research positions are available in the Physics Department at Boston College, Both require Ph.Ds. A research physicist will have responsibility for analysis of autoral particle data from Air Force Satellites in conjunction with present ongoing research. A lackground in ionospheric or magnetospheric physics as required. Previous experience with satellite data is preferred. Salary is 20–25K. A sensor research physicist will have responsibility for carrying out a high energy particle data analysis program for forth coming satellites. Extensive knowledge of the radiation belts is required, as is experience in large volume data handling and numerical modelling of high energy particles. Salary is negotiable. Please send resumes to: Prof. R. A. Uritam, Chairman, Department of Physics/MAGR, Boston College, Chestnut Hill, MA 02167.

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Faculty Position/CSM. The Departments of Geology and Geophysics at Colorado School of Mines

ogy and Comprise to Amount appearance it anticipate an opening for a joint appearance it Professor of Geology and Geophysics to commence September 1, 1983.

The successful applicant will be expected to teach courses and conduct research integrating exploration geophysics with petroleum geology. Applicant should possess the Ph.D. degree and responsible experience in exploration geophysics the Ph.D. degree and responsible experience in exploration research and teaching.

A resume and references should be forwarded to
Dr. L. J. Finney, Head; Geology Department or to
Dr. George V. Keller, Head; Geophysics Department; Colorado School of Mines; Golden, Colorado 1. Closing date for applications is April 15.

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AMOCO Foundation Ph.D. Fellowship Department of Geology

University of Missouri-

Columbia The Department of Geology invites applications for the Amoco Foundation Fellowship to support an outstanding Ph.D. Candidate in any subdiscipline of geology. This 3-year fellowship includes a generous stipend, waiver of tuition and fees, and substantial funding to support research. The Department of Geology has dynamic research programs in sedimentology, sedimentary petrology, low temperature geochemistry, tectonics, geophysics, paleontology,

For application materials and additional information contact:

and Igneous and metamorphic petrolo-

Director of Graduate Studies Department of Geology University of Missouri-Columbia Columbia, MO 65211 The deadline for application is March 1, 1983.

Geophysicist/University of Montana. The Geology Department of the University of Montana is inviting applications to full a tenure track position at the assistant or associate professor level with a specialized area of geophysics beginning Sept. 1983. Teaching and research responsibilities at the undergraduate and graduate levels. Research interests abould combine solid earth geophysics and geology. Applicant must have the Ph.D. degree or expect completion by summer 1983. Those knearested should send a letter of application, resume, an outline of teaching and research interests and other relevant material. The applicants should arrange to have at least three letters of recommendation sem to: Arnold J. Silverman, Chairman, Department of Geology, University of Montana, Missoula, MT 59812.

The deadline for applications is March 15, 1983.

The deadline for applications is March 15, 1983. The University of Montana is an allirmative aciion/equal opportunity employer.

tion/equal opportunity employer.

The Pennsylvania State University/Faculty Positions. The Department of Geosciences mytes applications for three (3) tenure track faculty positions, which are expected to remain open and filled by outstanding geoscientists in any of several fields of specialization. The faculty tank associated with each position is presently open, although saturations correctly available are sufficient for at most one senior full professorship. Salaries, which are competitive, will be commensurate with the expendence and qualifications of the appointees. The successful candiclates must be, or have demonstrated the potential to become, nationally recognized leaders in their fields. They must also have an interest in teaching and advising graduate and undergraduin reaching and advising graduate and undergraduate students. Persons having an interest in collabora-

THEORETICAL OR **EXPERIMENTAL SPACE PLASMA PHYSICISTS**

NASA-MARSHALL SPACE FLIGHT CENTER Huntsville, Alabama 35812

Two positions in theoretical or experimental space plasma physics are available in the Magnetospheric Physics Branch of the Space Science Laboratory at NASA's Marshall Space Flight Center. Either theoretical or experimental backgrounds will be considered with a preference given to theoretically oriented researchers to complement the extensive experimental activities of the branch. The Magnetospheric Physics Branch is involved in the analysis of lowenergy plasma data from the ISEE, SCATHA, and Dynamics Explorer satellites, from sounding rockets, and from the Space Shuttle (STS-3). In addition, the group is presently carrying out the joint development of a variety of active space plasma experiments that will be flown on Spacelab One, Two, and Six.

Salaries range from \$34,930 to \$41,277 per annum, depending on experience.

Interested applicants may contact Dr. Charles R. Chappell at the Marshall Space Flight Center (205-453-3036). Forward resumes to the following address not later than March 1, 1983:

NASA-Marshall Space Flight Center Space Science Laboratory Attn: Dr. Charles R. Chappell, ES51-R2

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Huntsville, AL 35812

D.C. area.

POSITIONS WANTED

POSTTIONS AVAILABLE

Postdoctoral Research Associate Positione/Johns Hopkins University, Applied Physics Laboratory. Positions are available for studies of planetary magnetospheres, and for studies of earth magnetospheric and surroral physics. Selected candidates will participate in the analysis and interpretation of data obtained from deep space probes (Voyager), or particle, field, and atmospheric emissions data from earth orbiting spacecraft. Positions are one year renewable opportunities with flexible starting dates. Applications should be addressed to Mt. Stevan F. Sayre. Department LER-258, The Johns Hopkins University, Applied Physics Laboratory, Johns Hopkins Road, Lavrel, AID 20707.

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26

tive research with other department faculty are pre-ferred. Instructional and research areas in which particular needs have been identified include, but are not necessarily limited to: aqueous geochemistry, with emphasis on low-temperature rock-water (groundwater) interactions; heavy isotopeliracs element geochemistry, with emphasis on element distribution systemulis, and their geological applications: tectors. geochemistry, with emphasis on element distribution systematics and their geological applications; tectonics, with emphasis on global geophysical and geological processes and observable manifestations of them; sedimentary geochemistry, with emphasis on quantitative aspects of carbonate petrology or clay mineralogy; X-say mineralogy, with emphasis on petrological applications of crystallochemical methods; and modeling of dynamical earth processes using appropriate physical and mathematical representations.

tions.

The selection of persons to fill these three posi-tions will be based in part on the extent to which their future research efforts will complement and further strengthen our programs in Geochemistry and Mineralogy, Geology, and Geophysics. Quali-fied persons should, therefore, include a brief de-scription of their future greaters belief interesting the scription of their future research objectives with their resumes and the names of three references,

C. Wayne Burnham, Head Department of Geosciences
The Pennsylvania State University
503-B Deike Building
University Park, PA 16802.
The Pennsylvania State University is an affirmative action focus! proceedings to the pennsylvania state.

Franklin and Marshall College/Petrologist. We have a 1-year pusition for the 1983-84 academic year with the possibility that the position may be extended for 1 additional year. The position is full-time involving up to 12 contact hours/semester. Candidates would teach petrology (a one-semester combined igneous and netamorphic course) and either ecotomic realogy or a course in their periology.

combined igneous and nietamorphic course) and cither economic geology or a course in their specialty.
Candidates would also teach introductory physical
geology once a year. Completion of Ph.D. prior to
appointment is preferred but not essential.
Franklin and Marshall College has an active geology department which consists of 7 full-time staff
members and graduates 25 majors per year. Teaching and research facilities are excellent including an
automated XRF vacuum spectrometer. The college
is a small (2000 students) four year liberal arts institution.

tution.
Candidates should send resume and arrange for 3
letters of reference and transcripts to be sent to:
Dr. Stanley A. Mertzman, Chairman
Department of Geology
Franklin and Marshall College
P.O. Box 3003
Language PA 17604 P.O. Box 3003 Lancaster, PA 17604 Franklin and Marshall College is an equal oppor-

University of Miami-Rosenstiel School of Marino and Atmospheric Science/Carbonate Geochemist and Environmental Marine Geologiat. The Division of Marine Geology and Geophysics has openings for two Research Faculty (non-tenure track). One position will be at the Assistant Professor level and the successful candidate will be responsible for research in low temperature carbonate gentle.

et and the successful candidate will be responsible for research in low temperature carbonate geochemistry with emphasis on kinetics of diagenetic reactions of natural carbonate materials.

One position will be at the Assistant or Associate Professor level and the successful candidate will be responsible for developing research programs in environmental marine geology, appropriate for the sub-tropical setting of South Florida.

Successful applicants will be expected to support their salary and research from grams and contracts. Please send curriculum vita and mames of three references to:

erences to:
Dr. C. G. A. Harrison
Division of Marine Geology and Geophysics
Rosenstiel School of Marine and Atmospheric Sci-

ence 4600 Rickenbacker Causeway Minmi, Florida 33149. The University of Miami is an equal opportunity/

Iowa State University of Science and Technology, Department of Earth Sciences/Faculty Positions. Applications are invited for a tenure-track faculty position in mineral resources. Rank is at the assistant or associate professor level, dependent upon qualifications. The successful applicant will be expected to develop a strong research and graduate student program in mineral resources/economic geology and will teach undergraduate and graduate courses in this subject. An applied field orientation is preferred.

Is preferred.

Iowa State has established a Mining and Mineral Resources Research Institute in order to support and develop research and education in inheral resources. An interdepartmental graduate inhor in Mineral Resource has also been established. In addition to the appointment in the Department of Earth Sciences, there will be full opportunities to interact with these programs.

with these programs.

Completion of the Ph.D. prior to appointment is strongly preferred. In addition, research ability shown by other publications and/or postdoctoral or industrial experience will be an advantage. The position is currently available and is expected to begin no later than September 1983. For application information release write to:

rmation, please write to: Bert E. Nordlie, Chairma

Bert E. Nordlle, Chairman
Department of Earth Sciences
253 Science I
Iowa State University
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level, including acid ram formation, 2) design and exalitation of field experiments and operations in weather module atton, including had suppression, 3) arteralt and tadar investigations of daniderstorms, 4) radiation and remore sensing from salellites, 5) mesoscale data analysis, and 6) analysis and source apportionment of atmospheric particulate matter. Superide for the info-mouth academic year vary from \$1,400 to \$5,600, full-time summer employment generally is available. For further information connect Dr. Briant 1. Davis, Acting Head, Department of Meteorology, South Dakota School of Mittes and Technology, Rapid Cits, South Dakota 57701-3395 (telephone 605/394-2201). quire the applicant to be articulate, literate, theyable, and able to work well with people from diverse professional backgrounds.

Public policy background is not required although such experience and/or demonstrable interest in applying science to the solution of public problems is desirable. How to apply: Candidates should submit a letter of intent, a curriculum vitae, and three letters of recommendation. The letter of intent should include a statement of why the fellowship is desired, how you quality for it.

why the fellowship is desired, how yout quality for it, what issues and congressional situations interest you, what role you envision as a congressional science fellow, and what outcome you hope for in relation to career goals. The individuals from whom you request letters of recommendation should discuss not only your professional competence, but also other aspects of your background that make you particularly qualified to serve as a Congressional Science Fellow.

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Tectonic modeling Seismic data processing mact: Dr. Kevin P. Futlong Dept. of Geology/Geophysics University of Wyoming PO Box 3006 Univ. Station Laranne, WY 82071 307/766-1379.

networlday, meaning the pollution chemistry and physics. Graduate study can lead to a Master of Science degree in Meteorology at SDSM&T as well as a Ph.D. through a couperative program with Colorado State University. Current areas of research emphasis include: 1) munerical cloud modeling at the single-cloud and measscale <u>Meetinas</u>

The fellowship carries with it a stipend of up to \$27,000 plus travel allowantes.

Send the above to: Department MP, Congressional Science Fellowship Program, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, D.C. 20009.

Graduate Research Agaistantships Available/De-

partment of Meteorology, South Dakota School of Mines and Technology. Several graduate research assistantships are available beginning Fall 1983 in the areas of numerical cloud modeling, chuid physics, weather modification, radiative transfer, radar

Application Deadline: March 31, 1983.

Announcements

New Geodesy Session at **AGU Spring Meeting**

A new Geodesy session entitled Future Trends in Space and Terrestrial Gravity Measurement and Analysis will be featured at the Spring Meeting. This session is designed to promote a discussion of new gravity measuring techniques, including gravity gradients, satellite-to-satellite tracking, and absolute apparatus. The scope of this session includes the presentation of both the instrumentation and the methodology of analysis.

IAGA at IUGG

The International Association of Geomagnetism and Aeronomy (IAGA) will participate in the General Assembly of the International Union of Geodesy and Geophysics (IUGG), to be held in Hamburg, F.R.G., August 15-27, 1988. Specialized symposia for the IAGA meeting were listed in Eos (June 8, 1982, pp. 532–533). In addition to those sessions, there will be ample time in general sessions for papers not related to the specialized sessions, according to IAGA President Keith D. Cole. Sessions of general contributions have been scheduled for all subjects in the purview of An education of an anolects in the purview of IAGA, including solid-earth magnetism, upper-atmospheric physics (including aeronomy and ionospheric physics and magnetospheric physics), and related topics for the moon and including are also as a solid physics. planets as well as for the interplanetary medi-

Interested participants who do not have the third IUGG bulletin, which includes the registration form, should write to the Local Organizing Committee IUGG 1983, Hamburg Messe und Congress GmbH, Postfach 30 23 60, D-2000 Hamburg 36, F.R.G. The deadline for the receipt of abstracts is March 15, 1983. Please post your original manuscript by air mail to N. Fukushima, secretary general of IAGA, Geophysics Research Laboratory, University of Tokyo, Tokyo 113, Japan. A copy of the manuscript also should be sent to the first convenor of the session for which the presentation is aimed. For additional information, consult the third bulletin or IAGA News, No. 21, November 1982.

Travel Grants to **IUGG General** Assembly

Deadline for applications; January 31, 1983

AGU has applied to the National Science Foundation for digrant to assist the travelor inelvidual U.S. scientists to the 18th of heral Assembly of the 10GG to be held in Hamburg Pedial Republic of German Agust 15–27, 1983. In anticipation of favorable action to NS application forms for Individual grants are available from:

American Geophysical Union 2000 Florida Avenue, N.W. Washington, D.C. 20009 Telephone: 202/462-6903 or toll free: 800/424-2488)

Ahoy!

6 weeks

March 9 Abstract Deadline for the

1983 AGU SPRING MEETING May 30-June 3

Contact: AGU Meetings 2000 Florida Ayenuc, N.W. Washington, D.C. 20009

(202) 462-6903 D.C. area (toll free) 800 424-2488

Call for papers published in EOS, November 30, 1982 and January 18, 1985

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FEDERAL REPUBLIC OF GERMANY 15-27 AUGUST, 1983 Session Summary and Information on Submission of Abstracts To receive the Third IUGG Circular, which contains additional IUGG 1983 Hamburg Messe und Congress GmbH Scope P.O. Box 30 23 80 D-2000 Hamburg 36 Federal Republic of Germany Tel.: (040) 3 59 23 81 Telex: 212 609 Telegram: hamburgmesse For general information, see Eos, June 8, 1982, pp. 532-533. SUBMISSION OF ABSTRACTS Closing Dates 1983 UGG Inter-disciplinary Symposia AUGU Briser Sunday To Convenors Convenors to Local Organizing Committee (Hamburg) Hon Scientific Meetings
To Secretary General, Convenor.
President of Section
To Secretary General, Convenor
To Secretary General, Convenor
To Secretary General, Convenor
To Secretary General, Convenor
see description of IAMS programm
To Secretary General, Convenor
To Secretary General, Convenor
To Secretary General, Convenor - 1 March - 15 March - 15 March - 15 March - 1 March - 15 March - 1 March **XVIII GENERAL ASSEMBLY** The meetings and symposia at the General Assembly will includ IUGG - Planary and administrative meetings of the Union — Union lectures — inter-disciplinary Symposia — IUGG Scientific Committee meetings NGG ASSOCIATIONS Pilanary and administrative meetings
 Association symposis
 Meetings of Association Sub-structural groups NTER-UNION COMMISSION orrenission on the Lithosphere (ICL) will hold scientific and administrative INTER-DISCIPLINARY SYMPOSIA M I ал-ызыными этигова inler-daciplinary symposia are planned. The Association responsible for each symposium is amphesized and diher Associations and Commissions with an inlerest in the symposium are AUGG SCIENTIFIC COMMITTEE MEETINGS Currently not yet scheduled.

INTERNATIONAL UNION

XVIII GENERAL ASSEMBLY

OF GEODESY AND

HAMBURG

GEOPHYSICS (TUGG)

UNION LECTURES Prof. Marcel Nicolet RAflexions aur l'Année Géophysique Internations Prof. J. C. L Dooge The Waters of the Earth Prof. Rudolf Sign Contributions of satellite geodesy to geosalen INTRA ASSOCIATION SCIENTIFIC MEETINGS IN THE ASSOCIATION SCIENTIFIC MEET INGS Its expected that most of the Association Commissions, Sub-Commissions, special groups, working groups, etc. mentioned in the IUGG Year Book 1981, will meet at the time of the General Assembly. IUGG INTER-DISCIPLINARY SYMPOSIA 1 Structures and Processes in Subduction Zones This Symposium mainly desig with the sedimentary, igneous and mantie structures of subduction zones revealed by setsric and other geophysical-geological techniques as well as the pro-cesses of their formation and development from theoretical an Prof. K. Kobayashi, Ocean Research Institute, University of Tokyo, 1-15-1 Minemidal, Nakano-ku Dr. I. S. Sacka, Camegie institution of Washington, Dept. of Terrestrial Magnetism, 5241 Broad Branch Road, NW, n. of Ferrestrial Magnetis Shingion DC 20016, USA should be sent to Prof. K. Kobayash Lithospheric Deformations IAG, IAGA, IASPEI, ICL This symposium will cover the whole temporal and spatial spectrum of intra- and inter-plate deformations. Hence papers are sought deating with magnetic, selamic and geodetic evidence for both past and present deformations. Papers dealing with new techniques may also be included. Prof. Kulf Lambeck, Australian Nat. University, Research School of Earth Sciences, P.O. Box 4, Prof. Zeng Rong-Sheng, Institute of Geophysics, State Selemological Bureau, Beijing, China Prof. M. W. McElhinny, Research School of Earth Sciences, Australian Nat. University, P.O. Box 4, Canberra 2800, Australia

Dr. Llebscher, Fed. Inst. Hydr., Kalserin-Augusta-Anlegen 18, D-5400 Keblenz, Fed. Rep. of Mr. James Crease, institute of Oceanographic Sciences, Brook Road, Wormley, Godelming, Surrey QUS 5UB, England Prof. M. A. Chinnery, National Geophysical Data Center, NOAA

At the symposium, the physics of the solid Earth part of it, we shall focus on the tectonic evolution of the polar regions and peal and present geodynemic processes. Of particular interest is the passive polar continuatal mergins, the retailively thick beain sediments in the Arcilic and the tectonic origin of unusual features like the Alpha-ridge. Tentatively, we envisage several sessions: structures and evolutions of the Arcilic and Antarctic regions in general, results and lessons fearmed from the FTAM IV and similar expeditions and finally the resource potential of the polar regions. Papera-on at types of investigations will be considered, and besides those covaring topics already mentioned, we would fever those on new geophysical techniques and most recent structural results. Length of presentation should be around 20 minutes. Data Management IAGA, all other Associations, ICL, CODATA Geophysical research depends on large collections of diverse data gathered at many times and pisces. Reducing linese data to common formels, cataloguing, preparing summary displays, archiving and advertisement are parts of the titat step in distributarchiving and activerisement are parts of the first step in distributing lises of data to potential users. Commitment methods of access to specified subsets of the data, techniques for editing and reformating, simple means of display, are parts of the second step. Once the data reach the user, this year enalyzed by a variety of techniques, as, for example, time series analysis. The growth of committee the topic parts of the series analysis. communications, make it possible to automate these processes of data collection, organization, discomination and analysis, it is the purpose of this symposium to identify and discuss various techniques which have evolved in the subdisciplines of geophy-Prof. R. L. McPherron, Inst. of Geophysics and Plan. Phys., Univ. California, Los Angeles, California 90024, USA Prof. Tscheming, Geodaetisk institut. Gemiehave Aliee 22, DK-2920 Charlo Dr. O. Dahlman, Research Inst. for National Defence, FOA 202, S-104 60 Stockholm 80, Sweden Dr. F. Chayes, Geophysical Laboratory, Carnegis Institution, 2801 Upton Street NW, Washington DC 20008, USA Or. R. Ivanov, Laboratory for Geomathemetics and Geodele Geological Institute, U1 36 Block 2, Sofia 13, Bulgaria Dr. S. Ruttenbarg, Net. Center for Almosoheric Research P.O. Box 3000, Boulder, Colo. 80307, USA Mr. F. Bullot, Chaf Section Hydrotogia — IRM, Av. Circulatra 3, B-1180 Brutalias, Belgique.

> 326 Broadway, Boulder, Colorado 80303, UBA should be sent to Prof. R. L. McPherron

January 25, 1983 EOS Prof. Kurl Lamback 7 Hot Spots and Mantle Plumes We request papers on all aspects of intra-plate volcanism— Island chains, assismic ridges, confinental sibalic basalts, flood basalts, and distremes — giving their locations, age relations, physical cheracteristics, and their chemical and leotopic signa-tures. We also request papers on the deeper mantle processes which might produce those features and on their implications for mantle-wide evolution. Crustal Accretion in and around iceland The process of crustal accretion has now been observed in the current rilling episode in Iceland with geodetic, geophysical, vol-canological, geochemical, petrological, geological and other methods. Many other studies in and around todand are equally relevant to the subject, such as those bearing on the deep geophysical structure, on the tectonic history, on hydrothermal circulation, on equivalent phenomena eisswhere in the world, etc. In coljunction—not jedependently—all may permit us to assess the dynamic roles of deformation and stress, plate motion, magma generalion and assent, crustal fauting, and other sepects of a more complete model of crustal scorellon Hopefully the symposium will be a forum for a truly, interdisciplinary discussion and exchange. Prof. J. Morgan, Department of Geological and Geophysical Sciences, Princeton University. Princeton, New Jersey 06544, U.S.A. IAVCE Prof. E. R. Kanasewich, Dept. of Physics, University of Alberta, Edmonton, Alberta, T8G 2Jr., Caneda should be sent to Prot. Moroan 8 Assessment of Natural Hazards IAG Dr. Sigurdur Steinthorsson, Science Institute, University of Ice-IABPEI, IAVCEI, IAHS, IAPSO, TSUNAMI C. science Building, 101 Reyldavik, Icoland Assassment of hazarda from earthquakea Statistical methods for datermination of regional earth Or. Wolfgang Jacoby, Institut für Meteorologie und Geophysik, Feldbergstr. 47, D-8000 Frankfurt a. M., Fed. Rep. Germany Dr. K. Gronvold, Nordic Volcanological Institute, University of iceland, 101 Reykjavik, iceland 1.2 Determination of local serthquake risk
1.2.1 Influences of focal parameters
1.2.2 Influences of propagation parameters
1.2.3 Effects related to selamic ground motions as alope movements channae in burtohniral avaign should be sent either to Dr. Steinthorsson or to Dr. Jacoby Geodetic Features of the Ocean Surface and their implications - Marine gravity field - Saletitle altimetry, See Surface Topography, Marine Goold Prof. G. Schneider, Institut für Geophyeili, Richard-Wagner-Sir. 44, D-7000 Stuligart 1, Fed. Rep. Germany Salatife attimetry, Sea Surface Topography, Marina Goold determination
 Allimetry and geophysical interpretation
 Allimetry and physical oceanography
 Status after GEOS3 and SEASAT, dedicated saletitle missions
 Global and regional lidal models
 interaction between tidal models-geold-gravity
 Marine geold as a reference surface for geodesy, geophysics and Oreanography Assessment of natural hydrological hazards Assessment of netural hydrological hazard:

1 Statistical methods

1.1 Estimation of probability of river flooding

1.2 Evaluation of flood frequency et a alogie site

1.3 The use of regional records to assess flood in

1.4 The practision of estimates of frequency

1.5 The combined risk of river and tidel flooding

The hydrological places of flooding and Oceanography Mean sea Level, Ocean currents 2.2 The hydrological effects of flooding on agrice 2.3 The assessment of avalanche risk Methods of improving flood warning IAG Prof. Dr. G. Seeber. University Hannover, Institut für Erdmossung, Nienburger Strees 5, D-3000 Hannover 1, Fed. Rep. Germany, Talex 92 38 68 unihnd should be sent to the Convenor Prof. G. Schneider (address see above) with copies to the Or. J. V. Sulcline, institute of Hydrology, Maclean Building, Crownersh Gifford, Wallingford, GB-Oxon OX10 8BB, UK Or, John Apel, Johns Hopkins University, Johns Hopkins Road, Laurel, Maryland 20810, USA Assessment of hazards from teunamis Generation of taunamis Propagation of taunamis Taunami run-up phanomons Case histories should be sent to Prof. Seebor 5 Geophysics of the Polar Regions 3.4 Case histories
Scientific, engineering and socio-oconomic questions are to be discussed. The first and second international polar years and the interna-tional geophysical year, 100, 50 and 25 years ago opened the polar regions and the world to coordinated international scentific activity. This Symposium commonosates these endosvors by should be sent to Or. Loomis Dr. H. G. Loomis. Ocean Engineering. University of Hawaii, 2540 Oofe Street, Honolulu, Hawaii 96822, U.S. A oxamining the present state of knowledge of geophysics as applied to the problems and opportunities of polar regions Papers for this main part of the Symposium are by invitation only Dr. Misashi Miyoshi, Tokyo University of Fisheries. 5-7 Kenan 4 Cheme, Minate-ku, Tokyo 108, Japan Dr. Mark Moier, Glaciniogy Water Resources Orvision, U.S. Geological Survey, 1201 Pacific Ave., Suite 806, Tacoma, Washington, 98402, U.S. A. Dr. C. Newhall, United States Geological Survey. 5400 MacArthur Blvd, Vancouver, WA 98861, U.S A Prof D. Möller, Institut für Vermessungskunde, Technische Universität, Pockeistrasse 4, D-3300 Braunschweig, Fed. Rep. of Germany Time-Dependent Processes and Properties in Planetary Materials Dr. E. S. Husebye, NTNF/NORSAR, P.O. Box 51, N-2007 Kjeller, Norway IASPEI, IAVCEI, ICL Large-scale rate-dependent goological processes with a view lowards physico-chemical microprocesses Pmil O Gonzales-Ferran, Departamente de Geofísico Universidad de Chile, Cesilla 16, non-equilibrium material properties as they are importantle. 9 in hydrothermal processes and the rheology of crust and Prof. M. H. Rees, Geophys. Inst.-Univ. of Alaska, Fairbanks, Alaska 99701, U.S.A. eaction kinetics of phase transitions - reaction kineits of prese rameous
- time dopendent petrological and mineralogical changes
- solid, liquid and gaseous diffusion
- time dependence of physical properties (e. g. elastic trensport)
- general firme-aspects on various ecules: cosmogonic, planetelogical, geological, recent, al laboratory experiments Prof. M. Kuhn, inst. Geophysik und Melacrologie, Universität Innabruck, Bohopfatrasse 41, A-6020 Innabruck, Austria IAPSO Dr. Amold Gordon, Lamont-Doherty Geological Observatory, Pelisades, New York 10964, U.S.A. Prof. H. Stiller, Zeniralinstitut für Physik der Erde, Telegrafenberg, ODR-1500 Potsdam, Germen Democratic Republic There will also be essions in the second part of the Symposium referring to topics summarized in the following Scope. Abstracts of pages to be contributed to this part of the Symposium should be sent to the IASPEI Co-Convenor Dr. E. S. Husebye. H. Spetzier, Cooperative Institute for Research in Environmental Sciences, Campus 8ox 449, University Colorado at Boulder, Boulder, Colorado 80309 USA Dr. H. Mazureky, United States Geological Survey, Branch of Astrogeological Studies, 2255 North Gemini Drive Flagsteff, Arizona 88001 USA IAVCEI

Magnetospheric

Earth The Tides inn irvington, Virginia April 5-8, 1983

Contact: AGU Meetings 2000 Florida Avenue, N.W. Washington, D.C. 20009 800 424-2448 (toll free) (202) 482-5903 (D.C. area)

28

ICL Dr. S. Akimoto, institute of Scitt State Physics, University of Tokyo, Minstu-ku, Tokyo 108, Japan

10 Heat Flow and Geothermal Processes

Heat flow as the surface expression of geothermal processes a

depth
- regional conductive heal flow patierns
- heat flow anomalies caused by water circulation (local and

geothermal manifestations of tectoric and magmatic proces

Prof. Dr. L. Rybach, Institute of Geophysics, ETH-Hoenggerborg, CH-8093 Zurich, SWITZERLAND

Dr. J. H. Sass, U.S. Geological Survey. 2255 North Germini Drive, Flagatati, Arizona 85001, USA

11 Structure and Composition of the Oceanic Crust

This two-day symposium wit consist of invited and unsolicited contributions which relate to the evolution of oceanic crust (age-dependent properties), the formation of new crust (including and transform fault plain-boundary processes) and the nature of the crust in the ocean basins (including intrapitate pro-

Dr. R. B. Whitmarsh, Institute of Oceanographic Sciences, Wormley, Godalming, Surrey GUS SUB, LK — telex 858833

Prof. N. Petersen, Institut für Aligemeine und Angewandte Geophysik, Universität Monchen, Theresienstr. 41, D-8000 München 2, Fed. Rep. Germany

Or. H. Shirmamuta, Lab. for Ocean Bottom Selamology, Geophysical Inst. Holdsido University, Sappore 060, Japan

should be sent either to Dr. Whitmersh or to Prof. Petersen

The purpose of this sympositm is to passes the importance of varical upili, riding and volcarism as expressions of mantle processes. A betance between geologically, and geophysically oriented reviews is intended, with emphasis on integrating data from both fields. We especially encourage process-oriented put

IAPSO. Prof. T. D. Q. Hilds, Department of Opeanography, Texas A and M College Station, Texas 77843, U.S.A.

12 Plateau Uplift, Rifts and Volcanism

IAVCEL, IÁBPEI, ICL

RCL Or. J. Francheleau, Centre Oceanologique de Bratagne. BP 337, 29273 Brest, France

should be sent to Prof. Stiller

IAHS Dr. L. Affaidi, National Water Authority, F8-u. 44-80, H-1011 Budapest, HUNG

should be sent to Prof. Rybach

IAVCEI, IASPEI, IAPSO, ICI

IASPEI, IAVCEI, IAHS

Prof. M. Knutzielson, Zontral Institut für Physik der Erdo. 18 Ridge Creat Hydrothermal Activity and the saniations dealing with the origin, growth, stability and ultimate fate of plateaus and fifts. A comparison of oceanic and continential plateaus will be an edditional topic. Within this framework ass-Chemistry of Sea Water IAPSO, IAVCEI, ICL ons will deal with ands with the wind the control of the crust and mantio beneath plateaus o. "Improved gravity field estimations on a global basis"

Topics: — Accuracy of tatastrat gravity data on a global basis

— Accuracy of cantart gravity data on a global basis

— Accuracy of cantart gravity data on a global basis

— Anniysis of satulity rolled data for geopotental improvements

— Need and prospects for now — and long — term improvements This symposium will consider the affects of hydrothermal activity at mid-ocean ridges; the chamical composition of sea water and and ritle;

Models concerning the origin and evolution of vertical upifit and lateral lithospheric movements and their surface expres-Prof. J. M. Edmond,
Department of Earth and Planetery Sciences,
Messachuseits Institute of Technology,
Cambridge, Massachuseits 02139, USA - Geophysical aspects of global gravity field models. Prof. R. H. Rapp, Dopt. of Geodelic Science and Surveying. Prof. H.-U. Schmincke, Institut für Maersloglo, Ruhr Univorsität Bochum, Postfach 10 21 48, 0-4630 Bochum, Fod. Rep. of Germany Ohio Sisto University, 1958 Neil Ave Columbus, Ohio 43210, (U.S.A.) nors (AVCE) Dr. G. E. Sigvalasson, Nordic Volcanological Institute. University of Iceland, 191 Reykjavik, Iceland 5, 2, 3, 4 Co-Convenor IASPEI Dr. R. W. Girdler, University of Newcastle upon Tyne. School of Physics, Newcastle-upon-Tyne NE17RU, England, U.K. d. "The future of terrestrial and space methods for positioning Prof. J. M. Edmond Prof. H.-U. Schminde should be sent to Prof. J. M. Edmond omployons, receivers, types of marks, etc. 1;
3 Integration of GPS/Transit-Dopplor date into the classical should be son! to Prof. H.-U. Schmincke nolworks (mathematical medies, etc. . .); l. opilmization techniques applied to GPS/Joppler surviys. norlidi Burveying with special desphasis on 19 The Ocean and the CO2 Climate Response 13 Scientific Discoveries from MAGSAT Investigations The interaction between atmospheric CO, and the oceans will be examined from a climatological point of view. Questions to be addressed include the variation of atmospheric CO, with see-surface temperature, oceanic sources and sinks of atmospheric CO, the ublake of arthonormals CO. IAOA, IASPEI, IAVCEI, IAPSO The complete Magsat data set is now available to all interested investigators from the Space Science Data Center, Code 601. NASA/Goddard Space Fight Center, Greenbet, MB 2071. Prehmarry courts of analysis of Magsat data are presented in the April 1982 issue of Geophysical Research Letters. 3. accuracy limitations of mortial systems h dicentry lithiatans of montal systems. Applications of space techniques to vertical notworks with special emphasis on

1. utilizing positions determined geometrically from space for controlling vertical networks (requirement for precise goods).

2. utilizing geometrically determined heights in conjunction with leveling to determine the goold.

3. the role of space techniques in defining a vertical detum (use of altimotry and 3-D positioning);

4. utilizing space techniques to monitor vertical networks. April 1982 is a us of Geophysical Research Letters.

This session is to provide a forum for presentation both of new results of direct analysis of Magsat date and also of studies closely related in the sense that they confirm Magsat results or (ay groundwork for interpretation of Magsat date. Appropriate logic include (1) modeling of the Earth's main relagnetic field. (2) studies of motions of core fluid responsible for the main field. (3) identification of crustal anomalies and their interpretation in terms of modeling the crust and, (4) studies of lonospheric and magneto-spheric current systems and the resulting currents induced in the Farth. Dr. R. Bacastow, Scripps Institution of Oceanography, University of California at San Diago, P.O. Box 109, La Jolla, CA 92307 U.S.A. Dr. L. Merthat, Department of Physical Chemistry, SACLAY Center for Nuclear Study, 91191 Gif Sur Yvette, Cedex, FRANCE Capt, J. D. Bosslor, National Goodetic Survey, NOS/NOAA, Rockville, Md. 20852, (U.S.A.) IAPSO Professor K. Hasselmann, Max-Planck Institut für Mejeorologis. Bundesstraße 56, 2000 Hamburg 13, Fed. Rep. of Germany sections concerned: IAGA Dr. Robert A. Langel, Geophysics Branch, Code 922, NASA Goddard Space Flight Center, Greenbell, MD 20771, USA ion of and relationship between inortial and leavesties ayalents;

- Definition of norizonial and vertical datums and relationship with the letrestrial reference system;

- Geodetic and astronomical constants Professor J. A. Jacobs, Bullard Laboratories, Medingley Rise, Madingley Road, Cambridge, CB3 OEZ, ENGLAND should be sent to Dr. R. Becasiow Dr. G. Lachapelle, Sheltech Cenada, 425 – 1ºStreet S. W., Calgary, Alboria, T. 2. P. 2. H. 5, Canada Tel. (403) 232–4321, Talox: SHELTECH CGY 03–827983 20 Oceanic and Atmospheric Boundary Layers tAVCEI Prolassor I. Yokoyama, Department of Goophysics, Holoauto University, Sappore 080, JAPAN Consideration of the upper ocean and adjacent atmosphere as an interacting system, with emphasis on time scales of days, rather than months or years; transfer of mornentum, heat and mass across the at/sea interface and bance upward (downward) from Or. Conaid F. Monnehs, Oceanographic Division, National Science Foundation, Washington, DC 20550, USA and adjecent etmosphere as an ving geodatic problems in developing countries"

1. Technical assistance projects — Can they become instrumental in the development of national geodetic agencies?

2. Problems of maintenance of imported geodetic equipment.

3. Research in geodety. Can developing countries afford it?

4. The possible effects of the lack of augusta height and gravity data on Depoter positions established in developing countries. should be sent to one of the Convenors 14 Interim Results from the Middle Atmosphere Pro-IAPSO Dr. R. T. Polard, institute of Oceanographic Sciences, Wormley, Godalming, Surrey GUS 5UB, England AGA, IAMAP, SCOSTEP Or. P. K. Taylor The Middle Akthosphere Program (MAP) is a major informational cooperative program under the ICSU Scientific Committee on Sour-terrestrial Physics (SCOSTEP), for the period of 1982–85. Dr. A. M. Wossel, 6, Fayourn Street. Scape Sour-terrestrial Physics (SCOSTEP), for the period of 1882–85, at ming all solving visitous scientific problems of the middle atmosphere (atthuto range 10–110 km) with the sid of modern appreaches and tools Because of a great variety of research and a great number of expected contributions, the pager presentation is so arranged that this symposium consists only of invited talks, and all contributed papers are to be submitted to the Middle Almosphere Sciences symposium sponsored jointly by IAMAP, UIGA, SCOSTEP and COSPAR. The explanation and session submitted or the latter symposium are given in the IAMAP part of this IUGG circular. should be sent to Dr. Pollard or Dr. Taylor actions concerned: 21 Coastal and Near Shore Zone Processes Prof. H. Moritz, President of IAG, Technical University of Graz, IAPSO, IAMAP, IAHS A. Physical Processes
Consideration of the dynamics and thermodynamics of the coassections concerned: Consideration of the dynamics and tremmournamics of the collec-tal and not-shore occan atmosphere-land system; dynamics of coastal circulation; response to almospheric forcing; influence of liver runoff and topography on circulation, transport and midding. Submission of Abstracts
Scientists wishing to proson a priper in any IAG Sympostum should send the original abstract to the Secretary General of IAG, one copy to the curvenus of the sympostum concerned and one copy to the prosident of section concerned
Abstracts should be mailed in sufficient time to prive no inter than 1 March 1983, Abstracts received after the deadline will not be necepted.

Instructions for proparation of IAG abstracts are the same as for IUGG abstracts. These instructions are given in the ANNEX. Convenior IAGA Prof L. R. Mogill, Conter Almospheric & Space Sciences.
Utah State Univ., Logan, Utah 84322, USA Or. Paul H. LeBlond, Ospartmeni of Oceanography, University of Brillen Columbia, Vancouver, B. C. V6T 1W5, Canada Dr. Svante Bodin, Swedish Meteorological and Hydrological Instishould be sent to Prof. L. R. Megis Netional Reports
The usual national reports shall be prepared for delivery at the General Assambly labout 100 Box 923, S-60119, Norrkoping, Sweden 15 Remote Sensing for Climate Studies IAHS Dr. Robert Beardaley, Woods Hole Oceanographic Institution, Woods Hole, Massachusents 02543, USA IAMAP, 1APSO, ILICPIM, URSI, COSPAR Additional information Additional information on IAC programmes and activities may be obtained from the Secretary Cimate research depends heavily on remote sensing satellite as well as surface-based systems to provide the global data needed for climate diagnostics and climate modelling. The extraction of useful data from current and future mondering systems will Attention will be given to the chemical processes occurring in satuaties and in the near shore coastal zone; water chemistry, require a new dimension is accuracy and long term consistency. Fullhermore the accentife interpretation of the data from remote sensing sateble instruments demand a profound understanding of the physical (and chemical) processes in play at the earth's surface, in the altmosphere and within the sensor. The symposium will deal with the study of almospheric, oceanic, cryospheric, and land surface properties important for climate research using retmost sensing techniques and valince activities. INTERNATIONAL ASSOCIATION OF SEISMOLOGY AND Professor T. M. Church, College of Marine Studies Lewes Complex, University of Delaware Lewes, Delaware 11958, USA PHYSICS OF THE EARTHS INTERIOR (IASPEI) PARTICIPATION IN IUGG INTER-DISCIPLINARY SYMPOSIA Professor B. L. K. Someyajulu, Physical Research Laboratory, Nevrangpura, Ahmedabad 380008, India /mpoela under IASPEI loadership No. 8 Assessment of Natural Hazarde No. 9 Time-Dependent Processes and Propurties in Plunctary Mulerials No. 10 Host Flow and Goolhormal Processes restant using remote sensing techniques and will give particular emphasis to the accoming interpretation and analysis of remote sensing data for climate research, and to the unique contribution of remotely sensed data to planned climate research pre-cessmes. IAMAP Dr. Svante Bodin address see A. Symposia in which IASPEI has an intoroat
No. 1 Structures and Processes in Subduction Zenes
No. 2 Lineauhoric Deformations IAHS Dr. J. C. Duinkar, The Netherlands Institute of Sea Rosearch, P.O. Sox 59, 1780 AB den Burg, Yarel, Netherlands Convenor IAMAP Dr. J. E. Harries, Rutherlord & Appleton Lab., Chixter, GB-Oxon OX11 OOX, Great Britain Lithospharic Dolormations
Geophysics of the Poter Regions
Data Management
Hot Spots and Manite Plumes should be sent to Dr. Paul H. LeBiond (A. Physical Processes) Prof. T. M. Church (B. Chemical Processes) Co-Convenors IAPSO Dr. Celberine Gautier, Celfornia Space Installe, UCSO/SIO, A-030, Ls Joža, California 92083, USA No. 11 Structure and Composition of the Oceanic Crusi No. 12 Plateau Uplift, Filits and Volcaniam No. 13 Scientific Discoveries from MAGSAT Investigations Submission of IUGG Symposia Abstracts Dr. J Rattger, Max-Ptanckinst Asronomie, Postisch 20 – Undau 3, D-3411 Katienburg, Fad Rep. Germany Abstracts for IUGG Symposis should be prepared and submitted strictly following the instruc-flore given in the ANNEX. These abstracts have to reach the appropriate Convenor before 15 IASPEI GENERAL ASSEMBLY Dr. G. Ohring, Climate and Radiation Branch, NASA/GSPC, Greenbelt, Maryland 20771, USA ASPEI will hold its 22nd, General Assembly in conjunction with the XVIII IUGG General Assembly, 15–27 August 1983, in Hamburg. In addition to participating in Union softwiles, IASPEI will hold scientific meetings on the topics specified below. IASPEI Commissions will see meet. In addition to the Presidential Address, Association Lectures will be given by Dr. 8. INTERNATIONAL ASSOCIATION OF GEODESY (IAG) L. N. Kennelt and Prof. G. J. Wasserburg.
L. N. Kennelt and Prof. G. J. Wasserburg.
National Correspondents, and others, should note that pienery business seasons are planned for 15 August and 24 August. Among items of business will be election of officers for the ensuing period, and the presentation of accounts, as woll as the consideration and adoption of resolutions. Countries are no longer required to present National Reports, but those are welcome if countries wish to prepare them. 16 Sealce Margins PARTICIPATION IN IUGG INTER-DISCIPLINARY SYMPOSIA Symposis under IAG leadership
No. 2 Lithospheric Determations
No. 3 Crustal Accretion in and around iceland
No. 4 Geodelid Features of the Ocean Surface and their implications easonal and interannual variations of the positions and nature of the sea ict imms; air-ice ocean interscion processes associated with the sea ice margins, oceanographic and meleorological leatures and processes associated with sea ice margins; formation (ASPEI Scientific Meetings (Dates are atili provisional) Symposis in which tAG has an interest No. 5 Geophysics of the Polar Regions No. 6 Data Management and determination processes, and characterized properties of sea ice near the mangine, regional studies including the Antarctic sea modeling of marginal ico zone dynamics and thermodynamics IAHS Dr. Robin D. Mucrich, Serior Research Occanographer, Science Applications, Inc., 13400 B Norming Way, Suite 36, Berletue, WA 98005, USA IAG SYMPOSIA D-3392 Clausthal-Zellerield, Fed. Rep. Germany In addition to the above Symposia, the international Association of Geodesy will hold specific Symposia selected by the Executiva Committee at its meetings in Tokyo, May 1982. Prof. L. Stegens, Institute of Geophysics, L. Eölvös-University, Kun Béla tér 2, 1083 Budapest, Hungary symposts selected by the Executive Committee at its meetings in Tokyo, May 1982.

a. "The role of gravimetry in geodynamics"

The symposium to be hald during the General Assembly of IUGG in Hamburg will deal with the various applications of local, regional and global gravity trata to geodesy and geophysics in terms of Interpretation of the Earth's structure (lithosphere, artherosphere, alc.), escular and appendiot variations of the gravity field in connection with subsidence, uplift, dic. of the Earth's surface and related phenomens as tow depths as well as gravitational effects associated with global phenomens affecting the system of inference. Pre-, co- and postaleterite effecting the system of inference. Pre-, co- and postaleterite effecting the system of inference. Pre-, co- and postaleterite effecting the system of inference. Pre-, co- and postaleterite effecting the system of inference in visits of improved gravimetric feethingues, Special steering in the prediction of serving in the prediction of gravimetry with geometric tochniques such as VISB, lease natellite techniques, in view of distortion in long-range fereing results the combination of leveling data with gravimetry has to be seen as a technique which should be supplemented by purely geometric observations in dealing with geodynamics is afterseed.

Convenit:

Prof. Dr. Erwin Groten, Institut (it) Physicallante Conference. Co-Convenors (APSO Dr. Ola Johannessen, Geophysical Institute, University of Bargon, N-5014, Bargon, Norway, Contributions should cover aspects of ancient heat flow density Dr. Gunter Wolfer, Geophysical Institute University of Alaska, Farbanks, AK 99701, USA Commoutions should cover aspects of ancient heat now usuary within the cruat. Emphasis will be on geophysical, geological and geochemical methods which are qualified to estimate temperature gradients during the past.

Reviews and commuted papers will be given on the evolution of the surface temperature and the changes of the thermal regime hadness the areas. should be sent to Dr. Muench 17 Low Latitude Coupled Ocean/Almosphere Circuothermies 1/2 Day — 25 August Dr. R. Haenel, Niedersäche, Lendesamt (, Bodentgractung, A. Bentz-Haus, Silhsweg 2, P.O. Box 54, D-3000 Hannover, Fed. Rep. of Germany IAPSO, IAMAP Equalonal upworking processes; dynamics of mensionn-wind sys-tems, stabliky of tropical currents; eddes and waves; large scale ocean-almosphere interaction and climate effects; theoretical aspects of equational circulation. Dr. V. Cermsk, Geophysical Institute, Booni II. CP 1401, 14131 Praha 4 — Sporilov, IAPSO Dr. David Halporn, NOAA Paolic Monte Environmental Laboratory, 3711 15th Avenue N. E., Scatth, Washington 98105, U.S.A. There is an urgent need to standardize measuring and correction procedures as well as representation of data used in decisionaria such as temperature, temperature gradient, thermal conductivity, feel flow density, geothermal resources and reserves. Besed on airdedy extering preliminary results special topics will be continued. There will be only a britted number of paper presentation; the contribution work of the workshop will be put on discussion to produce further results. Prof. Dr. Erwin Groten, Institut für Physikalische Geodäsie, Petersenstrassa 13. Tochnische Hochachule Dermatadi, Teleion 08 181-163109, D-6100 Dannsladi, Fed. Rep. Germany Co-Conveners UPSO Dr. Henry Rotschi, C.R.S.T.O.H., B P.A. 5, Nourrea, New Caledonia

a routional results about the chort — and long — form one of the Earth's rotation (polar motion and L.O.D) and the relations with other geophysical phenomens.

Theoretical investigations using different Earlin's models.

Effects of the Earlin's core.

The state of the s

1/2 Day (& commission) — 17 Aug. Prof. J. Darbyshirs, Dept. of Physical Oceanography, "Marine Solence Labs, Menal Bridge, Anglesey, Gwynedd LL59 SEY, North Wales, UK

Prof. A. V. Nikolsev, Inst. of Physics of the Earth, Academy of Aciences of USBR, Bolehaya Gruzinstalya 10. Moscow 123 242, USBR

Or. C. Frankbysous.
Lisboratory of Physics and Marke Chambsby, University of Paris.
Lisboratory of Physics and Marke Chambsby, University of Paris.

b. "Geodynamic sapects of Earth's relation"
— Latest chambsby.

form 24-25, 4 Place Jueseu, 75230 Peris, France

Professor E. B. Sarachic, CEPP Pleice Hall, Harvard University, Cambridge, MA 02138 USA

should be sent to Dr. Halpem

30

Map of the World)

minity and Selemic Hexard \ Poster -- 17 August Rizsema, KNMI, Box 201, 3730AE De Bill,

Dr. A. R. Rite

The session is involved with the relation between storm waves and microseisms. The discussion will be particularly involved with the structure and directionality of the microseism as exemplified Prof. R. Malaroda, Instituto de Geologia. Via Accodemia delle Scienze 5, 10123 Torino, Italy INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY (IAGA) Display of European and regional seismicity, of selemo-tectorics and hazard maps, of deep selemic sounding sections, of deep selemic sounding sections, of deep selemic to the European seleminosphere, and of other malertels relevant to the work of the European Selemological Commission 4. Serthquake Algorithms Poeler & 1/2 Osy — 24 August Convenors: Dr. D. J. Doornbos, NTNF /NORSAR, P.O. Box 61, N-2007 Kjeller, Norway PARTICIPATION IN JUGG INTER-DISCIPLINARY SYMPOSIA Symposia under IAGA leadershi No. 8 Date Management
No. 13 Scientific Discoveries from MAGSAF Investigations
No. 14 Interim Results from the Middle Atmosphere Program Submission of Abstracts
All Scientific Meeting to present a paper in any IASPEI Scientific Meeting should send the
original abstract one Secretary General and a copy to the appropriate Convenor for acceptance. Abstracts should be mailed in sufficient time to arrive not tater than 15 March 1983 Dr. E. R. Engdalvi, Chief, Branch of Globel Selamology USGS, Danver Federal Center, Box 25048, Stop 987, Denver, CO 80226, USA Symposia in which IAGA has an interest instructions for preparation of IASPEI abstracts are the same as for IUGG apatracts. Instructions are given in the ANNEX. improved selemic data and advances in computer technology have made possible dramatic progress in the development of earthquake algorithms. We seek now to better understand opti-mal methods for estimating all the basic parameters of earth-No. 2 Lithospheric Deformations
No. 5 Geomysics of the Polar Regions All abetraçãe will be screened by the conveners who will arrange them in assesons and forward them to the Secretary General. Abstracts will be printed by the Local Organizing Controlled this collected abstract volume which will be svallable to IASPEI registrants in Hamburg. IAGA SESSIONS AND MEETINGS akes and to present the algorithms in a practical form suite for routine use. To these ands the IASPEI Sub-Commission on Earthquake Algorithms is organizing a full day meeting to consist of a morning poster season for presentation of a broad range of currently available algorithms and an afternoon workshop for panel discussions on problems of earth structure, earthquake location, and source retrieval. Abbreviar Title of Session or Meeting (with sponsoring bodies)*:
tion Cosponsorship to be confirmed
RI Reporter Review Session of IAGA Division I on Internal Magnetic Fields
R2 Reporter Review Session of IAGA Civilian II on Aeronomic Phenomena
R3 Reporter Review Session of IAGA Civilian III on Aeronomic Phenomena
R4 Reporter Review Session of IAGA Civilian III on Aeronomic Phenomena Persons wishing to present papers either for the IUGG or IASPEI programs and wanting addi-ilonal information, should contect convenors directly, information on IASPEI programs and activities may be obtained from the Secretary General of IASPEI. Meetings of IASPEI Commissione The following provisional times are scheduled for meetings of IASPEI Commissions orler Review Session of IAGA Division IV on Solar Wind and Interplaneten 5. Earthquake Parametera Poster & 1/2 Day - 26 August Convenors: Prof. S. J. Dude, Institut für Geophysik, Reporter Raylew Session of IAGA Division V on Observatories, instruments, indices and Data Commission on Microssiams Standard Earth Model Committee Commission on Earthquake Prediction Commission on Quantitative Geodynamics 17 August (p. m.). 17 August evening. 18 August evening. 19 August (p. m.). 19 August. Indices and Data
Business Meeting of IAGA Division I
Business Meeting of IAGA Division II
Business Meeting of IAGA Division II
Business Meeting of IAGA Division IV
Business Meeting of IAGA Division IV
Business Meeting of IAGA Division V
Business Meeting of IAGA Division V
Business Meeting of IAGA Interdivisional Commission on History
Business Meeting of IAGA Interdivisional Commission on History
Business Meeting of IAGA Interdivisional Commission on the Middle Atmosphere
Business Meeting of IAGA Interdivisional Working Group on Relations between
External and Internal Magnetic Variations
Mathematical Modelling of the Goomagnetic Main Field and Secular Variation,
and its Applications (WG) —1) Bundestrasse 55, D-2000 Hamburg 13, Fed. Rep. of Germany Dr. J. Vanak, Geophysical Institute, Bochi II, CP 1401 14131 Praha 4 — Sportiov, Czechostovalda nission on Digital Seismology mission on Physical Properties of Majerial of the Earth's Interior "Earthquake Parameters" is a Symposium and a Poster Session evolving from thee Workshops on Quantification of Earthquakes. The Workshops were held as part of the General Assemblies of IASPB in Durham (1977), Canberra (1979), and London, Ontario (1981). See Special Issues on Quantification of Earthquakes, TECTONOPHYSIGS vol. 48, No. 2-4, 1978, 119-272, and vol. 64, No. 1, 1982, 1-130. Progress in instrumental and theoretical seismology offers new possibilities for expressing the earthquake phenomenon by way of physical parameters. In particular, digital throad-band recording of selsmic waves is being gradually introduced at many observationies. Also, the dynamic properties of the earthquake focus, as well as the selsmicity in general are being described in mathematical models of increasing quelity. Wany researchers are working on conceptual developments and on applications in practice. Data centers steadily increase the number of asrthquake parameters routinely reported. "Earthquake Parameters" is a Symposium and a Poster Session The Commission on Controlled Source Selamology will be arranging a separate Workshop, at Einsledein, Switzerland, in the week 8—12 August. No format meeting of the European Selamological Commission is planned. and its Applications (WG I-1)
Origin of Mein Fields and Secular Changes of the Earth and Planets (WG I-2)
Electromagnotic Studies of the Earth (WG I-3)
The Origin and Significance of Regional Geomagnetic Anomalies (WG I-4)
Megaptares and Microplates (WG I-5)
Paleomagnetism and Dynamo Theory (WGs I-5, -2)
Basic Theory and Experiments on the Magnetic Proporties of Oxides and Sulphides (WGs I-5, -6) (ASPEI Association Lectures 25 August (a. m.) Prof G. J Wasserburg Interesces of Mantie Structure and Evolution from Isotopic Geoc Battic Treory and Experiments on the Magnetic Proporties of Orides and Sulphilos (WSS 1-5, -6)
General Contributions to Division to a Internet Magnetic Fields
Cosmic Dust in Planetery Autospheres (Dw. 8; IAMAP, IAU, COSPAR)
knospheric Modification (Div. III with URSI*)
Equatorial lanospheric irregulanties (Div. II)
General Contributions to Division it on Astronomic Phenomena
Electrodynamics of Polar Atmosphere and Magnetosphera (Dws. II & III with
URSI*) 23 August (a. m.) August (A. m.) Dr. B. L. N. Kennett Conhierns in Perepective* Data certains seeminy streams the number of saminquake parameters routinely reported.

On this background "Earthquake Parameters" will serve as forum for discussions on the subject. While formal presentations are scheduled for the Symposium, it will be possible to display material and discuss it on an individual bays in the Poster Session. Accents for future research and practice concerning earthquake harmaneters are expected. INTERNATIONAL ASSOCIATION OF VOLCANOLOGY AND CHEMISTRY OF THE EARTHS INTERIOR (IAVCEI) Amparative Study of Ptanetery Magnetospheres, lonospheres and Atmos-letes (Divs. B & III) neters are expected. Tole of lonospheric Plasma in the Plasmasphere and Magnelosphere (Olvs II & PARTICIPATION IN IUGG INTER-DISCIPLINARY SYMPOSIA 6. Earthquake Prediction: Theory, Physics, and Case Histories
Poster & 1 1/2 Day — 22—23 August
Convenors: Prof. J. H. Rice, Div of Applied Sciences. Harvard University,
Pierce Hall, Oxford Street, Cambridge, Mass. 02138 Theory and Modeling of Hydromagnetic Waves (Div. III) Genoral Contributions to Christon III on Magnetospheric Phe Large-Scale Soler-Interplanetary Rolgtons (Div. IV) Turbulence and Kinotic Physics in the Solar Wind (Div. IV) Structures and Processes in Subduction Zones
 Hot Spots and Mante Plumes No. 11 Structure and Composition of the Oceanic Crust No. 12 Plateau Uplitt, Rifts and Volcenism Solar Maximum Transition (Drv. IV) Problems Related to Solar-Wind Composition (DIV IV) Prof. K, Shimazaki, Earthquake Research Institute, Yayol 1-1-1, Bunkyo-ku, Tokyo 113, Japan Symposia in which IAVCEI has an interest in which IAVCEI has an interest
3 Crustal Accretion in and around lockind
5 Geophysics of the Polar Regions
5 Data Management
6 Assessment of Netural Hazards
9 Time-Dependent Processes and Properties in Planetary Materials The session emphasizes atudies on the earthquake generation process of a kind which may lead to a more fundamental basis for shop on Geomegnetic Observatory and Survey Practice (Ow. V) (at Contributions to Derision V on Observatores, Instruments, Induces and rocess of a kind which may lead to a more fundamental basis for arthquake prediction. Themas of special interest include: 1) Use of geophysical observations (historic records, geodetic, in-situ stress, selemicity patterns, tectonic structure, selemic and electrical properties, pore-fulids, etc.) to develop and/or teel hypotheses on the iriggering of partiquakes and pre-selemic processes in the source region; 2) Theoretical models of earthquake instability, consistent with or plausity entrapolated from laboratory studies of determines in richion and fracture, and inclusive of realistic tectonic softlings for crustal deformation processes; 3) inter-relations between source deformation and the generation of potentially detectable geophysical fields or properly alterations; 4) Use of geological and selamicipated observations on fault behaviour to lest hypotheses on the ourrhquake cycle and recurrence for further improvement of long-term prodiction technique. Earthquake case studies of a kind that may contribute to a rational basis for prediction are particularly velicome. of geophysical observations (historic records, geodetic, in-situ Historical Events or People (History Comm., NGG) Heat Flow and Geothermal Processes
 Scientific Discovenes from MAGSAT investigations
 Ridge Crest Hydrothermal Activity and the Chemistry of Sea Water Comm.)
Ongin end Comparison of Sq and L Variations (WG E/I)
Separation of the Observed Magnetic Field into Main, lonespheric and Magneticspheric Contributions (WG E/I)
The External and Internal Magnetic Separation during IMS (WG E/I)
Equatorial Electropic and Counter Electropic (WG E/I)
General Contributions on Internal/External Effects (WG E/I)
Middle Atmosphere Sciences (MA Comm.) IAMAP, SCOSTEP, COSPAR) IAVCEI SYMPOSIA Meetings of IAGA Working Groups, and other meetings
1-1 WG 1-1 Analysis of the Mam Fleid and Secular Variations
1-2 WG 1-2 Theory of Planetary Magnetic Fields and Geomegnetic Secular Variations The symposium will focus on the physical mechanisms of omplacement cooling, and compositional evolution of sub-volcanic instrusions. Topics to be considered will include theoretical and observational evidence of the offects of heat and mass transfer on the form and composition of physical processes as well as the retailorables between volcanism and physical processes in shall-WG I-3 Electromagnetic induction and Electrical Conductivity (Earth and 7. Analysis of Strong Earthquake Motions Poster & 1/2 Day — 26 August Convenor: Prof. N. N. Ambraseys, Dept. of Civil Engineering, Imperial College of Science & Technology, https://doi.org/10.1006/j.com/10.1006/j Moon) Magnetic Anomelies (Land and Sea) Paleomégnetism Rock Magnetism WG II—A Electrodynamics of the Middle Atmosphere Joint WG (Divs. II & III) on Auroral Ovel and its Extension into Space of Magma Eruption (with Emphasis on Large Volcanio Blasts) Dr. R. S. J. Sparks: Research School of Earth Sciences, Australian National University, P. O. Box A, Capharra Act 2800, Australia (until 6th Jan. 1983) and thereafter Dept. of Earth Sciences, WG II—A Electrodynamics of the Mildle Atmosphere
Joini WG [Divs. II & II] an Auroral Oval and its Extension into Space
WG III—1. LLF Putestions
WG III—2. Composition of Hot Magnetospheric Plasma
WG III—3. Cuantitative Megnetospheric Models
WG V—1. Geomagnetic Observatories, Instruments and Standards
WG V—2. Melaor Observatories, Instruments and Standards
WG V—3. Magnetic Surveys and Charls
WG V—6. Geophysical Indices
WG V—7. Collection and Dissemination of Data
WG V—7. Collection and Dissemination of the Solar UV Irradiance
Join! Working Groups between IAGA and URSI:
WG on Wave Instabilities in Space Plasmas
Meelings for Strengthoning IAGA Sciences in Developing Countries
Workshop on Verus International Reference Atmosphere (VIRA) arranged by
COSPAR and cosponacred by IAGA and IAMAP
Coordinated Data Analysis Workshop & for the IMS (CDAW-8) arranged by
SCOSTEP Recent developments of strong-motion instruments Development of processing and interpreting strong-motion records.

New, mear-field strong-motion records of damaging earthquakes. - Atlenuation laws at close distances. The aim of this symposium is to consider the physical mechanism of volcanic eruptions including topics such as leve flowage, volof volcanic eruptions including topics such as lava flowage, vol-canic plume secont and generation and emplacement of pyroc-lestic flows and volcanic blasts. The symposium will deal with the-oratical models, field interprelation of the volcanic products and 8. Tsunsimi Wave Propagation 3/4 Day — 24 August Covenora: Prof. T. Y. Wu, California institute of Technology, dens, California 91125, USA Prof. S. L. Soloviev, inalitate of Oceanolo Academy of Sciences of the U.S.S.R., 23 C. Role of Volatiles in Magmatic and Volcanic Processes
Convenors: Dr. F. Le Guero, Centre des Feibles Redicactivités mbile CNRS-CEA, Domeine du CNRS, Place do L'Eglise, 91190 Gif aur Yvelte, France Results and theory of isunami wave propagation in the ocean and rolated selsmic waves. Prediction and mitigation of teunami effects will be included. Professor N. I. Khitarov, Vernadsky Institute of Geochemistry Analysical Chemistry, Voroblovakole Chaussee, Moscow B334, USSR CDW 9, Quantilative Geodynamics Poetor & 1/2 Osy — 19 August Convenors: Prof. H. J. Naugobauer, institut für Geophysik, Technische Universität Clausthal, Postfach 230, D-3392 Clausthal, Fed. Rep. Germany Short Explanations for IAGA Secsions of the Hamburg Assembly
11. Mathematical Modeling of the Geomegnatic Main Field and Secular Variation, and its
Applications Presentation and discussion of new techniques for the sampling, analysis and interpretation of volcanic gases including results of the meeting on Vulcane (September 1982). Pole of volatiles in rangmatic processes, sepe D. R. Barraclough, Geomagnetism Unit, Institute of Geological Sciences, Murchison House, West Mains Read, Edinburgh EHS SLA, Scotland, U.K. their influence on the atmosphere, relationship between gas com-position and volcanic activity, magma-gas interaction, gas-nod-interaction, volcanic gas-strosphere interaction. Role of volcanic gas transfer in one deposite and geothermal enomalies A one day easalon will be held on the above topic, in order to review recent advances in quantitative studies on processes causing or effecting operynamic phenomena like: plate movement and structural changes, rifling, orogeny and epiroganic W. Munck, Zentralinskitut für Solar-Terresirische Physik, Heinrich-Hertz-Institut, Rudower Chausses 8 1199 Bertin-Adlershof, German Dem. Rep. D. Magma Mixing in Volcanic Processes
Convenors: Dr. N. Vatin-Perigrion, Institut Dokomisu, LA60 Volcanologia,
Patrologie, Rue Maurice Gignoux, F38031 Grenoble Cedex,
France As a result of the observations of the geomegnetic field made during the recent Magsat mis-sion, we have an accurate description of the main field at about 1980. If these data are to retain the resultmum usefulness for an interval of several years we need accurate estimates of the secular varietion; such estimates remain among the main requirements for shades of movements.
Contributions should focus on modern developments of mathematical and physical techniques applied to geodynamic pheno-mens. Attention should also be drawn to the interaction of for instance mechanical, themsal, geochemical parameters and proof the secular varietion; such estimates remain among the main requirements for shudes of the Enrith integration field.

The aims of the session are: (i) to discuss new developments in methods of modelling the geometric main field and its accular varietion and (ii) to examine the resulting models and in particular, their approximents to such topics as the production of global amagnetic charts and reference fields and to the study of internal and external field sources. Specific topics of interest induses elementives to the traditional feethingue of spherical harmonic analysis; reports of new analyses and that evaluation; reference fields and that uses; satimates of the uncarbalities in field models; truncation effects and the separation of the cope field; problems of unward and downward continuation; secular varietion and secular acceleration and the problems. 10. Comprehensive Mapping of the Lithosphere Poster & 1/2 Day - 18 August (with Dr. M. P. Semet, Leboratoire de Geochimie Comparea et Systematique, Université Pierre et Marie Curie, 4 Piace-Jussieu, 75230 Paris Cedex 06, France Prof. V. V. Bejoussov, inst. of Physics of the Earth, Academy of Sciences of USSR, Bolshaya Gruzinskaya 10, Mospyracia and commencial commendation; section variation and section acceleration and the prob-lems of predicting the jutice behaviour of the goomegnetic main field on global and regional scales; application in the study of magnetospharic processes and of motions in the Earth's core; application of Magnetidate to the calculation of regional reference fields and charts. The symposium will focus on selected aspecia of m and magne chamber replantshment processes as they beer on crupites activity. It will cover recent research and/or new con-Dr. P. Glase, institut für Geophysikalische Wissenschaften Rheinbahenellee 49, 1000 Berlin 33, Fed. Rep. Germany eruptive activary. It will sure in capits in the areas of field geology, petrochemistry, thermody-namics and modelling. Detailed case studies at specific voice nosa may serve as introductory papers. The amount of geophysical data describing the Rhosphere increases rapidly, and is becomes more and more difficult to collect and compile all these results aiming to elaborate compering studies showing the mein features of the tithosphere in a comprehensive form. It is the task of this half-day symposium which is combined with another half-day poster seesion to discuss these problems. The convenors ask for contributions demonstrating how to present the different geophysical parameters in comprehensive forms (confour maps, cross sections sid.) which show the meth features of the continental and oceanic fithosphere. For this purpose global as well as regional presentation of the titudese, structure, physical parameters, and their lateral variebility are of interest. Parameters obsrecterizing the kinematic and dynamic behaviour of the titinosphere are of great tropotance, too. It is evident, that this tesk will not be finished with this symposium, but it will and must be started. Crigin of Main Fields and Secular Changes of the Earth and Planets
 E. R. Benton, Department of Astro-Geophysics,
 University of Colorado, Campus Box 391,
 Boulder, CO 80309, U.S.A. E, Flood Bessits Dr. K. G. Cox, Department of Geology & Mineralogy, University of Oxford, Oxford OX1 3PR, UK This ession will focus on the fundamental physical mechanisms responsible for the mainten-ance of the earth's internal magnetic field and its time variations during roughly the past 15,000 years (the most recent free Ohmic decay time). Reports of recent research on any aspect of this subject are appropriets, but especially welcome will be papers addressing the physical state, thermodynamics of energetics of earth's liquid outer core; the form of both hotzontal and vertical field motion's taking place within it; observations and theory of geom-agnetic westward drift short-ferm socular social retains and jest; all aspects of archeomag-nation and historical magnetic records. It is also hoped to include papers desting with the magnetic fields of the other planets or their satisface. Dr. K. V. Subbarao, Department of Geology, Indian institute of Technology, Powel, Bombay 400 078, India This symposium will be concerned with all aspects of the geology, geochemistry, nock magnetism and volcanology of continental flood peatif provinces as exemptified by the Decoan Traps, the Karoo, Parana, Antarotic, North Atlantic, Columbia FL, Siberian Traps, and similar provinces, though continuitions on other formations of comparable nature will be welcome. IS, Electromagnetic Studies of the Earth Convenors: V. Heak, Institut für Geophysik, Freie Universikil Betilin, Princinbebenate D-1000 Berlin 33, Fed. Rep. Germany Working Group Meetings
Further, a number of Working Group meetings will be organized by IAVCEI. Among others, meetings of the following Working Groups will be acheduled:
Decom Volcanism
Geothermat Models 11. Structure of the Deep interior of the Earth 1/2 Day — 16 August Convenors:

Prof. G. Moller, institut for Meteorologie v. Geophysis, Feldbergetresse 47, D-6000 Frankfurt s. M. 1, Fed. Rep. Germany O. Praus, Geophysical Institute of the Czschoslovakian Academy of Sciences, 141 S1 Prans 4 — Sportov, Czechoslovakia Submission of Abstracts
Scientists wishing to present a paper in any IAVCEI Symposium should send the original sharkel to the Secretary General and a photocopy to the first convenor concerned. Abstracts should be maded in sufficient time to enries to take than 15 March 1983, instructions for preparation of IAVCEI abstracts are the same as for IUIGG abstracts. These instructions for preparation of IAVCEI abstracts are the same as for IUIGG abstracts. These instructions The session will be concerned with all topics which are related to the experimental and theoretical investigation of electrical abructures and properties of the deep integer of the Earth. Of particular interest are studies of the electrical conductivity of sthosphere and setting entered in continential and oceanic areas, including active and geothermal zone). Theories for the integer topic of investion of electrical data will aid in the development of electrical attuckies models. Investigations of the electrical properties of rocks and minerals under appropriate experimental conditions will contribute to periophysical and tectoric microps of a Dr. V. F. Cormier, M. J. T. Earth Resources Lab., 42 Carleton St., Cambridge, MA 02142, USA Sherpness of transition zones in the upper mantle
 Structure of the transition between upper und lower mantle
 Structure of the lowermost mantle with special emphasis on question whether or not there is setsmological evidence to thermat boundary shove the core-maritie boundary tione are given in the ANNEX. All phatricia will be ecreaned by the convenors who will arrange tham in sessions and forward short to the Secretary General, Abstracts will be printed by the Local Organizing Committee in a collected IAVOEI abstract volume which will be available to IAVOEI registrants in Häm-Lateral heterogeneity of the mantie Structure of outer and inner core

Additional information .

Additional information on IAVCEI programmes and activities may be obtained from the

14. The Origin and Significance of Regional Geomegnetic Anomalies Convenors: A. G., Hahn, Bundezanska i für Geowissenschalten Richatoffe, Alfred Bentz Haus, P.O. Box 51 61 63, D-3000 Hannover 51, Federal Republic of German

P. J. Hood, Firm. 559, Geological Survey of Canada, 801 Booth St., Olbawa, Onlario, K1A OE8, Canada

In the past several years the completion of magnetic anomaly maps has revealed many inter-esting anomalies of a regional size whose origin lies other in the earth's crust or in the core. The fong-wavelongth components of these anomalies have also been delineated by satellite magnetometric survivys such as Magast Isuncrised in 1979. The separation of crustal anoma-lies and those produced by the earth's core is of much current interest. You are invited to sub-mit a paper to the conveners which bears on the sucidation of the origin of these geomag-notic anomalies, particularly with respect to their peological genesis and tectoric signifi-ance. A 250-word abstract should be submitted for consideration which summarizes the

D. B. Stone, Geophysical Institute, University of Afaska, Fairbanka, AK 99701, U.S.A.

A. N. Khiamov, Neftlercy Institute VNIGRL, Liebyi 39, Loningrad D-104, 192104 U.S.S R.

This session will be focused on the following general areas:

1. Polar-wander curves, reconstruction and paleo-latitudes (geographic and geomagnetic) for craterile blocks.

2. Recognition, tracking and paleogeographies of micropioles, tecton stratigraphic ferranes and other real-tracks areas.

3. The use of paleomagnetic techniques in unraveling the timing of rifling, collision or transform motion on plate boundaries.

in gameral this session is not looking for papers that are too local in their interest, but is siming as far as possible at the large scale problems that abound.

Paleomagnetism and Dynamo Theory
 Conveniers: R. T. Merilli, University of Washington,
 Geenography WB 10, Seattle, WA 98185, U.S.A.

There has been little cross-ferolization between paleomagnetism and dynamo theory. The purpose of this session is to encourage more interaction and manual understanding between workers in these fields. The intention is to seek out and define areas in which patient produces the many constraint dynamo theory and, conversely, areas in which patients consideration may constraint proposed considerations may constraint open include: walking of the exist dipote hypothesis, significance and nature of geomagnetic reversals, behavior of transdoral fields, variations in reversal arts over geologic time and their implications for core and manife eyolution, multipoles in the patential, variations in field strongly over periods ranging from 10³—10³/ears, asymmonies between N and R polarities and litter implications for dynamo theory, geomagnetic excursions as indications of magnetic "storms" in the core, and evidence for or against the electricist nature of the geodynamo.

17. Sanio Theory and Experiments on the Magnetic Properties of Oxides and Sulphides Convenors: S. K. Sanerjos, Oept. of Geology & Geophysics, University of Minnesota, 310 Pilisbury Otive S.E., Minnespois, AN 5445, U.S.A.

V. Shcherbokov, Geophysical Observatory Borok, Nekoussky Rogion, Yaroslavskaya Oblast, 152 742 U.S.S.R.

It was fell far too often we neglect to report advances or needs for advances in besic throny or exporments dealing with not kinagnotism. The purpose of the present assistent hierafortes an unabashed and crinical discussion of theories and exportments that form the core of lodey's rock magnetic knowledge. We would also like to know where we should be going five to ten years from now. Therefore, white we will accept peoper dealing with some or other application of "old" rock magnetic knowledge to paleomagnetic problems, we will, however, sotively oncourage papers dealing with new models, new theories and new observations in grain-size topendont properties and in all types of remanences (TRM, VRM, CRM, ORM). The following is a proposed fail of kepice.

). Theoretical and oxperimental studios about the origin of remanence in pseudo-single

Domain (Post) grains.

2 VRM — mockanisms for its origin and stability.

3 Comparison of DRM (Dopositional Flamamont Magnetization) and PDRM (Post-depositional Flamamont Magnetization) in soft sediments or sedimentary rocks.

4 Controlled studies of CRM (Chemical Romainant Magnetization) in rocks and synthetic

done to Division I on Internal Magnetic Fields O. I. Gough, institute of Earth and Planetery Physics, University of Alberta, Edmonton, Alberta T6G 2J1, Canada

This purpose of this GI-sossion is to provide a forum for those papers of high actentific interest in the earth's interest magnetic field but which are not appropriate to any of the epocial sea-

2X. Cosmic Outlin Planetary Almospheres (Cosponsored by IAMAP, IAU and COSPAR)

D E Brownige, Department of Astronomy, University of Washington, Seattle, WA 98195, U.S. A.

W. G. Efford, Physics Department, University of Adelaide, Adelaido, S.A. 5001, Australia

This soss on will cover all aspects of the effects of meteoritic meterial on planetary atmospheres. Materials input into atmospheres by meteoroids include original solids, vapor and recondensed solids. The moteoroid input comes from both the steady state entry of inter-chandrary dust particles and the transcrib input from major events such as pessage of the solar system through an interstellar cloud or collision with an asteroid or comet.

2), ionospherie Modification Convenor: P. Slubbe, Ms.4-Planck-Institut für Aeronome, Postfach 20, D-3411 Ketlenburg-Lindau 3, Fed. Rep. Germany The major emphasis of this session will be placed on tonospheric modification by powerful radio waves. The season will cover such topic is as paramotrically excited plasma instabilities, modification of the ambient tenesphene and atmospheric properties, and modifiation of natural isonospheric currents. A survey of the main results of previous experiments will be presented by invated speakers. The major portion of the season will, however, be devoted to the discussion of new findings. Combuted papers on other modification techniques (injection of beams and chemicats) are also welcome.

R. Reghaveraco, Physical Research Laboratory, Ahmedabad — 380 009, India

This session will discuss experimental and theoretical aspects of large-scale stratifications and small-scale trogularities in the plasma (ton-electron) concentrations and the electric fields associated with equatorial spread-F (ESF) and type—I and —Il inequatorial in the E-region of the equatorial tonosphero. In particular, the mechanism(s) for the bubble dynamics, the triggering of the equatorial conseption in particular, the mechanism(s) for the bubble dynamics, the triggering of the specific aspects which will be presented and discussed. Scentific contributions of the specific aspects which will be presented and discussed. Scentific contributions either on new experimental resurts or theoretical interpretations of the two phenomena (spread-F or electroje) imagularities) will be entertained for presentation and discussion. The abstracts should indicate clearly the new results of the contribution.

G2. General Contributions to Division II on Aeronomic Phenome Chillen, Didcot, Oson OX11 OQX, U.K

The purpose of this G2-abselon is to provide a forumfor those papers of ligh scientric interest in aeronomical research but which are not appropriate to any of the special sessions of Division III (and some cosponsared also by Division III), I a 2X, 2I, 2Q, PE, PA and PP sea-

PE, Electrodynamics of the Polar Atmosphere and Magnetosphere
Convenions: M. 11 Recs, Geophysical Institute,
University of Alaska, Fatbanka, Alk 99701, U.S.A.

R A Greenwald, Applied Physics Laboratory, Johns Heplans University, Leurel, MD 20707, U.S.A.)

The session will be devoted to reports on the dynamic behaviour of the themosphere (-80 to 1000 km), in the polar region is response to electric fields and energetic particles and on the dynamic coupling state exists between the longsphere and magnetosphere. Observational reports may be bit sed on salerier, not et and ground-based measuroments, the latter including rader, optical and magnetic field techniques. Papers devoted to high lattice phenomena are nightside and in the dayside cusp should focus on the dynamics of the noutral stime-phere and longsphere-magnetic spis phosphere. An appropriate may of experimental and theoretical papers will be described.

PA. Comparative Study of Planetary Magnetospheres, ionospheres and Almospheres
T. W. Het Department of Space Physics and Astronomy,
Wildes Echoci of Natural Sciences, Rice University,
P. C. Box 1892, Houston, TX 77251, U.S.A.

D. M. Hunten, Lunar and Planetsky Laboratory, University of Anzona, Tucton, AZ 85721, U.S.A.

Of the six planets that have been observed by spacecraft, all but one (Venus) have intensor magnetospheres, and all but one (Merbury) have service atmospheres. Although each of the planetary magnetospheres and atmospheres has unique properties, there also exist points of senderly shared by several or all of them.

points or sentently shared by several or all of them.
The purpose of this symposeum is to pursue the systematic comparison of planetary magneloopheres and of magnetosphare/pondsphere/attroophere interactions in order to identify
and better understand the points of similarly and the fundamental differences among them.
The ultimate good of auch comparative success to develop a unified theoretical framovenic
by which this properties of a glaver magnetosphere could be predicted at the properties of the
planet. So aemosphere, and the looded place wind were given.
Some observational and theoretical papers are subtiled, its keeping with the comparative
makes of the symposium, only those bases, and the instantial way with two or more planassume of the symposium, only those bases, as the claims material way with two or more plan-

PP. Role of loncepheric Plasma in the Plasmasphere and Magnetosphe Convenors: D. T. Young, Los Atamos Scientific Laboratory, Los Alamos, NM 37544, U S.A.

C. Fl. Chappet, Sotar-Terrential Physics Division, NASA Marshall Space Flight Center, Alabama 35812, U.S.A.

The earth's tonosphere is now recognized as a major source of plasma for the magnetosphere. Therefore, the incluse of the fonosphere source, the processes through which tonosphere plasmas are accelerated and transported into the plasmasphere and plasma trough, and the storage and loss of these plasmas become fundamentally important questions for magnetospheric studies. As the principal reservoir of thermal plasma in the magnetosphere, the plasmasphere is an important transitional particle population between the cod longe-plasmasphere plasmas, This session addresses the interchange of lesma between the processes and the plasmasphere/plasma trough regions including tonospheric composition relevant to magnetospheric plasmas amplet, filting processes such as polar which energiate and trap lonospheric plasmas in magnetospheric plasmas and indicated and lon acceleration to the trough and plast cap regions, processes such as ever-particle interactions which energiate and trap lonospheric plasmas in magnetospheric plasmas. The session that actions which energiate and trap lonospheric plasmas in magnetospheric plasmas. The session will contain both invited and contributed papers addressing tismanal and supraintermal (O-O eV) plasma characteristics. These papers are expected to draw from ground-based observations as well as recont satellite missions such as \$3~3, GEOS, ISEE and Dynamics Explorer.

SH. Theory and Modelling of Hydromagnetic Wayes Convenor: A. D. M. Walter, Department of Physics, University of Netal, Durban, Natal 4001, South Africa

In recent years substantial progress has been made in the field of magnetospheric U.F. pulsations through the close interaction of theory, modelling and experiment. This session will focus on the latest advances in the understanding of the hydromagnetic waves associated with pulsations. Papers are invited which fall broadly within this field including experimental papers retaing their results to new or existing theories or models.

The format will follow that of the very successful poster assetion at Edinburgh, on F12 pulsations. The session will be introduced by a series of invited review papers. All contributed papers will be in poster form. A substantial time will be allowed for the viewing and discussion of posters. Finally one or more reviewers will be invited to report and comment critically on the

G3. General Contributions to Division III on Magnetospheric Phenomena Convecor: A. Nighida, Institute of Space and Astronautical Science, Komaba 4-6-1, Meguro-ku, Tokyo 183, Japan

The purpose of this G3-session is to provide a forum for those papers of high scientific injer-est in magnetospheric research but which are not appropriate to any of the special sessions of Division III (and some cosponecred also by Division II), i.e. PE, PA, PP and 3H sessions.

4L. Large-Scale Bolar-Interplanetary Relations
Conveniors: R. Schwann, Max-Plenck Institut für Aeronomia,
Postfach 20. D-3411 Katienburg-Lindau 3, Fed. Rep. Germany

N. R. Sheoley, Jr., Kitt Peak National Observa P.O. Box 28732, Tucson, AZ 85728, U.S A. These two half-day sessions will be devoted to both theoretical and observational studies of the sun and its relation to the structure and variation of the large scale ineliosphere. Specific

pics will include: 1) Solar magnetic helds and their hallospheric expansion.

(1) Solar magnetic helds and their hallospheric expension.

(2) The origin of solar wind high speed and low speed plasmes and coronal sinutures auch as holes and streamers.

(3) The origin of heliospheric shock waves and magnetic clouds in solar disturbances such as coronal transferies, libras, and eruptive prominences.

(4) The radial variation of large-scale hallospheric properties extending from the sun libed to the outer limit of the heliosphere.

(5) The termonal variation of these relations during the sunspot cycle.

4T, Turbulence and Kinetic Physics in the Boler Wind Conveners: W. C. Feldman, MS D438, Los Alamos National Laboratory, Los Alamos, NM 87545, U.S.A

E. Marsch, Max-Pienck-Institut für Aeronomie, Postfach 20, D-3411 Kattenburg-Lindau, Fad. Rep. Germany

The major thrust of this session is to report recent measurements of particle velocity distribu-tion functions, MHD and plasma waves in the solar wind and to present theoretical work on

Cosperious Screenists designs the second sec adial evolution) and also in front of the earth's bow shock and

ration).
Neve-particle interactions, insightlity calculations for mea-ured distributions, determination of tree energy sources for view excitation particularly at collisionless interplanetary shocks, anomalous transport, radio wave excitation by Type III

 Observed characteristics and morphology of MHD furbulence and high frequency plazara waves, whistlers, electrostatic waves in the solar wind tradial evolution of fluctuations and their power specira, occurrence of waves in connection with large scale solar wind structures) and at interplanetery shocks (plasma wave excitations).
 Theoretical work or waves with emphasis on new concepts for MHD furbulence and on the excitations and extravely according to the contraction. MHD turbulence and on the excilation and saturation m

ism of pleams waves that shape particle distributions.

F. M. Neubauer, Institut für Geophysik und Meteorologie, Universität zu Kökt, O-5000 Koln 41, F. R. Germany

D. M. Rust, D.A.S O.P., Observatoire de Paris,

The session will be concerned with papers on the evolution of the solar corona and the interplanetary medium during the solar maximum transition, i.e. including the ascent of the solar activity, the time of maximum and the following decline. Theoretical papers and papers on countries and exercise cheenvalues are variousle.

4C. Problems Related to Solar-Wind Composition
Convenions:

K. W. Oglivie. Code 692, NASA-GSFC, Greenbell, MD 20771.
U.S.A.

This session will consist of both invited and contributed papers on theoretical and observa-tional topics. These will include, the composition of the solar wind and its relation to solar composition, the temperatures and speeds of minor lons in the solar wind, correlations of

Q4. General Contributions to Division IV on Solar Wind and Interplanetary Magnetic L. F. Surlaga, NASA — Goddard Space Flight Center, Code 692, Greenbell, MD 20771, U.S.A.

The purpose of this G4-session is to provide a forum for those papers of high scientific inter-set in solar wind and interplanetary magnetic field research but which are not appropriete to any of the special sessions of Division IV listed above.

VW. Workshop on Geomegnatic Observatory and Survey Practice
Convenors: W. F. Sluari, Geomegnatism Unit, Institute of Geological
Sciences, Murchison House, West Mains Road,
Edinburgh EH6 3LA, Scotland, U.K.

G. Fischer, Observatoire Cantonal, CH-2000 Neuchatel, Switzerland

The object of this Workshop session will be to bring together those responsible for operating observatories, those who notice and disseminate the data and also research workers who use them. It remains important to exchange views at all levels of observatory and survey practice in order to maintein or improve the quality of observations. While invited speakers may be stack to present an overview of some sepect of observational geometry exclusion in the present and the contributions from observars and instrumentalists. It is perfectly valuable to hear of problems identified even if they are not solved, in the present all units of the workshop lies in the contributions from observars and instrumentalists. It is perfectly which become any individual observational are not entitled even if they are not solved, in the present all units they are not solved. In the present all units they are they are not solved. In the present all units of the contributions which have experience in the problems which occur and in discover from individuals the process and considered indices in the Hamburg Workshop.

GV. General Contributions to Division V on Observatories, Instruments, Indices and

C. G. Sucksdorff, Division of Geomegnetism, Finnish Meteorological Institute, P.O. Box 503, BF-00101 Hetsinki 10, Finland

The purpose of this GV-session is to provide a forum for those papers of high scientific interest in the fields of IAGA Division V but which are not appropriate to the Workshop on Geom-agnetic Observatory and Survey Practice shows above. HE: Historical Events or Pacole
Gartenors: H. B. Garrell, Mas Code 144—216, Jet Propulsion Laboratory,

Jak Grove Ck., Jans. CA 91109, U.S.A. W. Schröder, Geoghysical Station, Hechelstraße B. D-2820 Bremen-Rosunebeck, Fed. Rep. Germany

The purpose of the IAGA interdivisional Harlory Commission is to encourage the study of the interdictal factors influencing geophysics and the enabytes of historical records. The specion seekles to commemorate the many historical events and properly that have contributed to the interpational studies of geophysics, 1983 is the enabytes and on the many of the most important of the interpational studies of geophysics, 1983 is the enabytes and the many of the most important of the contributed to the contri

these international geophysical studies (the 25th anniversary of the IGY, for example). Papers on the IGY and the international Point Years (1682–1883; 1932–1933) mu particularly studin. These papers should cover the people, the events, and their influence on modern geophysics Papers on the contributions of specific countries to those studies would be of great interest. 1983 is also the 100th anniversary of the crupilen of Krithaten. Also, as West Germany is the host country, papers on the Göttingen Magnetic Union, Gauss, and E. Wie-

HR. The Use of Historical Records in the Study of Geomagnetism and History Convenors:

H. B. Garrett, Mail Code 144—218.
Joi Propulsion Laboratory.
4800 Oak Grove Dr., Pasadona, CA 91109, U.S.A.

J. Faynman, Boston Callego. c/o AFGL/PHG, Henscom AFB, MA 01731, U.S.A

ne qua purpose o tro recommentensia commission del many y so coste interded borical events and in the study and prosorvation of historical records. This session is intended to promote the latter objective. In this poriod of tinancial restraint, many valuable collections of historical records are being lost as the older or financially marginal institutions that have housed these records are closed. It is critical that those data sources come to the attention of noused mess records are clear, it is critical and observated sources control to disciplion of the international community so that they may be preserved. Papers on such data sources would be of great value. Specific omphasis of the session will, however, the on the use of historical records in studying long term geophysical phonomena. In the post, papers on sureral and sunapet activity have been common examples. Undoubtiety, papers on long term variations in the magnetic figide or tides (both uccania and almospheric) would nise be of great interest. Finally, papers on specific data bases and on how to preserve data bases are

EO. Origin and Comparison of Sq and L Variations

D. E. Winch, Department of Applied Mathematics, University of Sydney, Sydney, N. S.W. 2006, Australia

J. C. Gupta (Division on Goomagnelism, Earth Physics Branch, Department of EMR, Ottawn KTA 0E4, Canada)

The purpose of this session is to examine external and internal fields of geomagnetic Sq and L variations, to compare similar and different behavior between the two variations, and to discuss their formation mechanisms. Deteited data enalyses of various tidal forms, global invastigations of morphological behavior of Sq and t. (such as day-to-day, seasonal, solar-cycle, secular, geomagnetic-activity, and latitudinal variations), discussions of ocean and ground induction effects, and estimations of induction source fields are destrable. The formation and propagation of tidal winds in the upper atmosphere and the three-dimensional wind dynamo, as well as the effects of solar winds, magnetosphere, and field-aligned currents, need to be laken into account. In other words, this session will provide a better understanding to sectomagnatic interactions from the interplanetary space through the earth's interior for Sq and L.

ES. Separation of the Observed Magnetic Field Into Main, ionospheric and Magnetospheric Contributions
Convenirs:

W. P. Cland. Space Sciences Constitute:

W. P. Olson, Space Sciences Department, McDonnell Douglas Astronautics Company, 5301 Bolsa Ave., Huntington Beach, CA 92647, U.S.A.

S. Matsushita, High Altitude Observatory, NCAR, P.O. Box 3000, Boulder, CO 80307, U.S.A. B. P. Singh, Indian Institute of Geomagnotism, Colaba-Bombay 400 005, India

The source currents for the magnetic field observed at the earth's surface are known to flow in the earth's core, the tonosphere and the magnetosphere in addition, because of the finite electrical conductivity of the earth's crust, currents flow near the surface of the earth in electrical conductivity of the earth's crust. Currents flow near the surface of the earth is espense to the temporable and magnetosphorts outronted it is desirable to separate the observed surface magnetostical fold into main, temporate, and magnetosphorts components. An accurate description of the main field permits the procise location of crustal magnetic anomalies, both the temporate and magnetosphorts physics communities and concerned with better quantitative descriptions of the sources and dynamics of the current systems that persist in each region. To identify accurately the sources and behavior of the solar quiet daily variation field at the earth's surface (Sqt), it is necessary to determine not only the day-to-vight variation but also the baseline of this field contribution. Papers submitted to this session afford the surface of the submitted to this session afford discuss these problems in a quantitative mannor. An altering will be made to formulate a quantitative statement concerning both the variability and the magnitudes of these sources of the earth's surface magnetic field.

El. The External and Internal Magnetic Field Separation during IMS Conveners: W. H. Campbell, Blanch of Electromagnetism and Geomagnet

U.S. Coast and Goodotic Survey, Rox 25046, M.S. 984. Denver Fodoral Center, Donver, CO 80225, U.S.A.

k.-K. Tschu, instituto of Goophysics. Acadomin Sinica, PO Boy 928, Poking, China

This session will concorn the separation of global geomagnetic food internal origin. The focus of the seasion will be upon geomagnetic records gathered during the IMS paried. Techniques of analysis, subcream and proparation of records for study, and application of the separated flekits to such lopics as earth conductivity and longituding the proparation of the separated flekits to such lopics as earth conductivity and longituding the proparation of the separated flekits to such lopics as earth conductivity and longituding the proparation of the separated flekits to such lopics as earth conductivity and longituding the separated flekits of the separated flekits of

EE, Equatorial Electrojat and Counter Electrojat Convenora: R. G. Anatogi, Indian Institute of Guernagnolism, Colaba, Bombay 400 005, India

E. Oni, Dopartment of Physics, University of Ibadan, Ibadan,

An eastward or westward electric field over the equational teneraphore is known to generate the normal equatorial effectivelet or counter electrojet currents respectively during the day-time. Both these currents have profound effects on the low halitude tenespheric plasma distributions and on the plasma tragularities. Attending to order the distributions and entire de currents but do generate irregularities in the Fragion designated as apread F.

spread F.

The present session would deal with the general features of equatorist electrojet and counter ofectrojet phenomena based on ground, recket and actellite measurements as well as on their association with tenespheric phenomena at less and tepsical hitterios. Papera are size invited on cultanding problems of these utertojet currents like their (attedinal and worked overtise, path of those current systems, associated with general Sq current systems, associated with general Sq current systems, association with interplanetery magnetic field and contributions would be encouraged in those current systems is very important and contributions would be encouraged in the entry of electrojets. Coupling between expension of their important aspects to be discussed.

GE. General Contributions on Internal/External Effecta Convenor: S. R. C. Malin, National Martilmo Musoum,

At previous meetings many papers have been submitted that do not it into the preordained mould. Since (in the convener's opinion) the main justification for IAGA is that if provides an international forum at which geophysicists can present and discuss their current work, it is important that the programms should contain a few 'dustibin' sessions for all the mislits. This is the mater thank of this existen.

is the major thrust of this session.

Providing the science is sound and they are not more appropriate to other assistins, we will welcome all papers that retate to internal/external aspects of magnetic variations, Sq. L. or models of the magnetic field between the surface of the core and the magnetosphere. (The External/Internal Working group is itself something of a dustbir.)

Joint IAMAP/IAGA Symposium on Middle Atmosphere Spiences (MAS)
This symposium is jointly organized by the IAMAP Continuesion on Meteorolog
Atmosphere (CMUA) and IAGA. Cosponeoring groups are the International C namopheric Chemistry and Global Pollution (ICACGP), Atmospheric Electricity (ICAE) Dynamic Meteorology (ICDM), Ozone (ICC), and Redistion (IRC). COSPAR and SCOSTEP also cosponsor this symposium iso cosporeor this symposium. tote that there is a separate fulGO Symposium No. 14 "Interim Results from the Middle

with review papers.

A. Ebel, institute for Geophysics and Meteorology.
University of Cologne, D-5000 Koin 41, F.H. Germany

P. C. Simon, Institut d'Aeronomie Spatiale de Belgique. 3. Avenue Circulaire, B-1180 Bruxelles, Belgique The emphasis of the program will be on the dynamics, energetics and chemistry of the middle atmosphere (about 10 to 120 km height). Special problems included are the electrodynamics.

The emphasis of the program wai be on the dynamics, energiage and characteristics almosphera (about 10 to 120 km height). Special problems included are the electrodynamics, of the middle atmosphere and the physics and chemistry of ions, sergeols and noctaices of clouds. Mutual interactions of the middle atmosphere regions and coupling with the tropolitic phare and upper mescaphere will be discussed. Seasions on remain sensing, climatological modeling and transport processes are planned. Mainly contributed and some invited papers. Other Meetings which welcome IAGA Participants

Workshop on Venus international Reference Almosphere (VIRA) arranged by COSPAP, and cosponeored by IAGA and IAMAP

pause, sinusture below 100 km, neutral upper atmosphere and theripal ture, lonosphere and solar wind interaction, solar and theripal radiation, perliculate medium in almosphere. The aim is the event.

G. M. Kealing, NABA Langley Research Center, Hampton, VA 23366, U.S.A. V. I. Moroz. Sternberg Astronomical Institute, Moscow, U.S.S.R. A. J. Kildre,
Jat Propulation Laboratory, Pasedens, CA 91 (03, U.S.A.

1 Data Analysis Workshop 6 (ODAW-6) arranged by SCOG18P

Die from:

R. H. Manke, Associateanth Office, National Asserch County
210 (Constitution Avenue, Westlender, D.O. 20418, U.S.A.);

(2)

Submission of Abstracts
All activities wishing to present a paper in any IAGA Session should send the original abstract to the Secretary General of IAGA, and a copy to the first Convenor of the session concerned. The deadline for the authmission of IAGA abstracts is 15 March 1983.

The deadline for the submission of Joint IAMAP/AGA Symposium (MAS) abstracts is 1

March 1983. The format for IAGA papers is the same as that for IUGG papers, which is given in the ANNEX. However, the typing instructions are alightly different, Detailed Instructions will be given in the next issue of IAGA News. Abstracts will be printed by the Local Organizing Com-mittee in a collected IAGA abetract volume which will be available to IAGA registrants in Ham-

information on IAGA programmes and activities may be obtained from the Secretary General of IAGA.

INTERNATIONAL ASSOCIATION OF METEOROLOGY AND ATMOSPHERIC PHYSICS (IAMAP)

PARTICIPATION IN IUGG INTER-DISCIPLINARY SYMPOSIA

Symposia under IAMAP leadership
No. 15 Remote Sensing for Climate Studies
No. 19 The Ocean and the CO₂ Climate Response

Symposis in which IAMAP has an interest
No. 5 Geophysics of the Polar Regions
No. 8 Data Management
No. 16 Hasulis from the Middle Atmosphere Program
No. 16 Sea ice Margins
No. 17 Low Latitude Coupled Ocean/Atmosphere Circulation
No. 20 Oceanic and Atmospheric Boundary Layers
No. 21 Cossist and Near Shore Zone Processes

IAMAP SCIENTIFIC SESSIONS The following information on IAMAP Symposia has been extracted from IAMAP First Circular, published by the Secretary General.

IAMAP Symposis
ACSP-1 THE APPLICATION OF STABLE ISOTOPES TO PROBLEMS OF THE
ATMOSPHERE, CRYOSPHERE AND OCEAN
ATMOSPHERE, CRYOSPHERE, CR This symposium is being organized by the IAMAP Commissions on Asmospheric Chemistry and Global Poliution (ICACGP) and Cilmate (ICCL).

The symposium will deal with the following:

1) "C and "C in markie sodiments to investigate past ocean circulation and paleocifimates;

2) Study of "H and "C tractionation processes in the course of the water cycle application to disastrate."

water cycle, application to climatology and paleoclimatology:

3) Analysis of isotopic records from ice sheets, comparison with Use of other stable isotopes (**C, **N, **S, ...) to investigate oceanic and atmospheric processes.

Three sessions are planned over a one day period. Or. D. Ehhalt, Institute for Chemistry, "Postfach 1813, D-5170 Jolich, FEDERAL REPUBLIC OF GER-MANY

Or. L. Marilvat, Department of Physical Chemistry, SACLAY Cen-ter for Nuclear Study, 91191 Gil Sur Yvette,

AE-1 THUNDERSTORMS, STRONG CONVECTION, AND LIGHTNING
This symposium is being organized by the LAMAP Commission on Atmospheric Electricity
(ICAE) and coopenizated by the Commission on Cloud Physics (ICCP).

Description:

This symposium is concerned with all espects of the dynamics. the microphysics, and the electrification of large storms cul

Two sessions over a one day period.

CL-1 8MALL-SCALE CLIMATE PROCESSES

Cu-1 SMALL-SCALE CLIMATE PROCESSES
This symposium is being organized by the IAMAP Commission on Climate (ICCL)
Description:

Development of built-up area in cities, defonsitation or afforostation, change from grassiand to field, change from desert to irrigated land, etc., have been causing sinking effects on distribution of climate in a local or micro-scale. Our knowledge about the effects of complex tarrain, such as estimation of the roughness parameter of complex terrain, and models of nocturnal downsions with a control of the complex terrain, and models of nocturnal downsions with the control of the symposium is therefore to evaluate the state of the symposium is therefore to evaluate the transfer. are quantisative treir enects or to illustrate models in the middle and high tatifude regions and to understand the physical processos which govern them. Topics will be:

(1) effects of changes in the earth's surface, such as urbanization, industrialization, deforestation, afforestation and artificial labor.

lake;
(2) effects of complex terrain, such as on the roughness parameter and on the model of nocturnal cold air drainings, cold air lake and thermal boit;
(3) interrelationable between the small-scale and the maso- of synoptic scale climate phonomens.

Three to four sessions are planned over a one and a half day

Professor M. M. Yoshino, instituto of Geoscienco, University of Teukuba, ibaraki 305, JAPAN.

OM-1 PRELIMINARY SCIENTIFIC RESULTS OF ALPEX
This symposium is being organized by the IAMAP Commission on Dynamic Moteorology
(ICDM) and is cosponed of the Hediation Commission (IRC).

Description:
The purpose of the session is to emphasize oarly results obtained using data from the 1861-82 lead phase of ALPEX. Papers are invited dealing with representation of the effects of organity in numerical models, as well as characteristics of the air flow over and around the Alcine complex: Alcine toe cyclogenesis; dieg. and around its Alpine complex. Alpine los cyclogenesis; dreg, variosi momentum transport and wevo energy dissipation; Alpine local whots; sensible and light heat fits over the Mediterranean Sen; differentiable and laterin heat fits over the Mediterranean Sen; differentiable and laterin heating bits officed by the Alpine range; its effect on precipitation; and severe weather phenomena of the ranker.

Two sessions are planned over a one day period. Professor W. Blumeri, Campus Box 391, University of Colorado, Boulder, CO 80309, USA

Professor F. Mesinger, Department of Meleorology, University of Belgrade, P. O. Box 550, 11001 Beograd, YUGOSLAVIA. DM-2 BLOCKING AND ATMOSPHERIC PREDICTION ymposium is being organized by the IAMAP Commission on Dynamic Meteorology

> of blocking; impact of blocking on the predictability of large-scale Two sessions are planned over a one day period.

Dr. J. Egger, Meteorological Institute, University of Munich, Theregianstraße 37, D-8000 Munich 2, FEDERAL REPUBLIC OF GERMANY. IM-3 PREDICTABILITY OF MESOSCALE PHENCIMENA

um is being organized by the IAMAP Commission on Dynamic Meteorology The recent emphasis on Improving mescassis forecasts, in parti-cular quantitative precipitation, her raised the questions of What mechanisms control the predictability of mesoscale phenomena and over what time interval can these events be predicted? The focus of these sessions will be centered on two main topics: (1) empirical determination of limits of pratictability of mesos

phenomena; (2) insoration of limits of predictability of mascscalle phenomens.

One day will be devoted to each topic. The distinction here between empirical and theoretical experiments will be understood to be abudies which use either real or idealized data for that conclusions. Note that in each essaion shaytical, numerical, or experimental studies will be classified in one of the two topics by whether the contract of the two topics by whether they use real or idealized detal.

Four sessions are planned over a two day period Or. I. Orlaneki, NOAA/GFOL, Princeton University. Princeton, NJ 08549 USA.

MUA-2 WORKSHOP on the TIDES IN THE MESOSPHERE AND LOWER THERMOSPHERE This Workshop is being organized by the UMAP Commission on Meteorology of the Upper Atmosphere's (ICMUA) Working Group of the same lite.

Session: Planned for a one day period. Professor J. Forbee, Department of Physics, Boston College, Chestnut Hill, MA 02167 USA.

PAE-1 RECENT ADVANCES IN PLANETARY METECROLOGY - A MEMORIUM TO SEY-

This symposium is being organized by the IAMAP Commission on Planetary Aimospheres and their Evolution (ICPAE) and cosponeered by the Commissions on Dynamic Meteorology (ICDM), Radiation (IRC), and possibly the Commission on Atmospheric Chemistry and Global Poliution (ICACGP).

During the gast two years there have been important observations of several planetary atmospheres in sufficient detail that enabled quantitative comparison with terraginal phenomena. In this symposium we propose a detailed intercomparison of the phenomena found in the atmospheres of Venus, Mars. Jupiter. Satum, and Titen. In particular, religions to their dynamical proposition and their charged comparities and their charged comparities. erties, radiative and cloud properties, and their chemical compo-sition will be highlighted. The discussions will be arranged in order to ratile our expanding showledge of these planetary atmos-pheres with more femiliar processes known in the terrestrial envi-

Three sessions are planned over a one and a half-day period.

R-1 INTERDEPENDENCE OF CLOUDS, TRACE SUBSTANCES, RADIATION, AND CLIM-This symposium is being organized by the IAMAP Commissions on Cibnete (ICCL) and Radi-ation (IRC). It is being cosponsored by the Commissions on Almospheric Chemistry and Global Pollution (ICACGP), Cloud Physics (ICCP), Dynamic Meteorology (ICDM), and Poler Meteorology (ICPM); and also by the WMO/ICSU Joint Scientific Committee for the World Climate Research Program.

regram.

Emphasis will be on two closely related aspects of the subject:

(1) Determinations of the radiative properties of cloud fields, observations of large-scale cloud systems, the effects of cloudness on the earth's radiation budget, and parameterization of the effects of clouds in general circulation models; determinations of the response of climate to changes of var-tous external and internal elements of the climate system, including treatment of rediction and feedback mechanisms in

Eight sessions are planned over a four day period.

Dr. W. W. Kellogg, NCAR, P. O. Box 3000, Boulder, CO 80307, USA

Professor E. Raschke, institute for Geophysics and Meteorology. University of Köln, Kerpener Strasse 13, D-5000 Köln 41, FEDERAL REPUBLIC OF GERMANY, Dr. V. Remanelhan, NCAR, P. O. Box 3000, Boulder, CO 80307, USA

Joint Symposia
MUA-1 JOINT IAGA/IAMAP SYMPOSIUM ON MIDDLE ATMOSPHERE SCIENCES (MAS)
This Symposium is being jointly organized by the International Association of Geomagnetism
and Aeronomy (IAGA) and by the IAMAP Commission on Meteorology of the Upper Atmosphere (ICMUA). Cosponsoring groups are the International Commissions on Abmospheric
Chemistry and Global Poliution (ICACEP), Atmospheric Electricity (ICAE), Dynamic Meleorology (ICDM), Ozone (IOC), and Radistion (IFIC).

Description:

The emphasis of the program will be on the dynamics, energy and other instances of the program will be on the dynamics, and solve the program will be on the dynamics, and solve the program will be on the dynamics, and solve the program will be on the dynamics, and solve the program will be on the dynamics, and solve the program will be on the dynamics, and solve the program will be on the dynamics, and solve the program will be on the dynamics, and solve the program will be on the dynamics, and solve the program will be on the dynamics, and solve the program will be on the dynamics.

C), and Radiation (IFC).
The emphasis of the program will be on the dynamics, energetics and chemistry of the middle atmosphere (about 10 km to 120 km height). Special problems included are the electrodynamics of the middle atmosphere and the physics and chamistry of ions, serosols and noctifucent clouds. Mutual interactions of the middle atmosphere regions and coupling with the troposphere and upper mesosphere will be discussed. Sersions on remote sensing, climatology, modeling and transport processors are planned. Mainly metology, modeling and transport processos are planned. Meint contributed and some invest appers will be included. There will be a separate IUGG symposium with review papers on "interin Results from the Middle Atmosphere Program".

Eleven sessions are planned for this symposium over a five day period Dr. A. Ebal, Institute for Geophysics and Meleorology.

Dr. P. C. Simon, Belgium Institute of Aeronomy. 3 Avanus Circulaire, B-1180 Brussets, BELGIUM

University of Koln, 5000 Koln 41, PEDERAL REPUBLIC OF GERMANY

PM-1 POLAR METEOROLOGY AND CLIMATOLOGY This symposium is being jointly organized by the Scientific Committee on Antarctic Research (SCAR) and the IAMAP Commission on Polar Meleorology (ICPM). It is being cosponed by the IAMAP Commission on Climate (ICCL). Papers on the aspects of polar maleorology and cl mo role of the polar regions in the global systems are acceptable, including GCM and climate models, ocean-lice-atmosphere interaction, redshort and sergy behavior, are constituents in the polar regions, romote sensing, and synoptic and local chonomics and recessors.

Four sessions are planned over a two day period. Professor G. Weller, Geophysical Institute, University of Alaska, Fairbanks, AX 99071, USA

Professor M. Kuhn, Instituto for Molecrology and Geophysics, University of Innebruck, Schopfstrasse 41, A-8020 Innebruck, AUSTRIA PM-2 ATMOSPHERIC ICE CRYSTALS AND HAZE IN POLAR REGIONS This symposium is being jointly organized by the international Association of Hydrological Sciences (IAHS) and the IAMAP Commission on Polar Metarorology (ICPM). It is cospon-sored by the IAMAP Commissions on Atmospheric Chamistry and Global Pollution (ICACGP) and Cloud Bhowless (ICC).

and Cloud Physics (ICCP). This symposium will deal with all appacts of ice crystal and haze it the poler almosphere: meteorological processes, physical pro-cesses, chemical composition, opical properties, electrical porties, lemporal and spatial distribution of precipitation, frajecto-ries of haze, and transport of ice crystels during and after precipi-

Two sessions are planned over a one day period

Professor M. Kuhn, institute for Meteorology and Geophysics, University of Innsbruck, Schopfstrasse 41, A-8020 Innsbruck, AUSTRIA All actinities wishing to present a paper in any Joint or IAMAP 8ymposium should send the original abstract to the Secretary General and a copy to the appropriate Convention acceptance. Abstracts about to the mailed in sufficient time to enrive not lister than 1 March 1983, Institutions for preparation of IAMAP abstracts are the same as for IUGG abstracts.

These instructions are given in the ANNEX.

Abairacts will be printed by the Local Organizing Committee in a IAMAP abatract volume, which will be available to IAMAP registrants in Hamburg. Additional information information and activities may be obtained from the Secretary General of Market on IAMAP programs and activities may be obtained from the Secretary General of

INTERNATIONAL ASSOCIATION OF HYDROLOGICAL SCIENCES

PARTICIPATION IN JUGG INTER-DISCIPLINARY SYMPOSIA

Symposium under IAHS leaders No. 16 Sea Ice Margina Symposia in which IAHS has an interest No. . 5 . Geoglysics of the Polar F

IAHS GENERAL ASSEMBLY The International Association of Hydrological Sciences General Assembly will be held con-currently with those of other IUGG Associations in Hamburg, Germany, 15-27 August 1983. The following is a listing of IAHS symposis and other matters pertaining to the IAHS Assem-

Business Meetings
The Association and its Commissions and Committees are expected to meet in plensay sectors during the Assembly as are the Bureaux of these bodies. IAHS plans to hold its first plensay seasion on the element of Monday, 15 August, its second plensary seasion on the evening of Friday, 16 August, and he little plensary seasion on the alternoon of Friday, 26 August 1983, at which times the presidential socious, reports of Commissions, alleotion of ficting adoption of resolutions and other matters will be taken up. An agenda of these meetings will be sent to all Hellonal Correspondents.

Bubmission of Abelracta ilist wishing to present a paper in any IAHS symposium should send a copy of his/ gournet to Dr. H.-J. Liebacher Federal Institute of Hydrology Katesta: Auguste Anlagen 18 D-6400 Kobienz Federal Republik of Germany

After arrival, the ebatracis will be sent immediately to the appropriate convenor. The papers of all IAHS symposis will be published as volumes of Proceedings in the IAHS series. The volumes of the symposis on "hydrology of Humid Trapical Regions with particular Reforence to the Hydrological Effects of Agliculture and Forestry Practice" and on "Dissolved Loads of Alvers and Surface Water Quantity/Quality Flatationships" will be prepublished; those for "Hydrological Applications of Remote Sensing and Flemote Data Transmission", "Relation of Groundwater Quantity and Quality" and "Scientific Procedures applied to the Planating and Magagement of Water Resources Systems will be quitelibed after the ord of

the Assembly.

The cost of each volume will be DM 85,— (C 20) if bought in Hamburg. The price of these proceedings will be increased after the assembly to £ 25. The perilicipents are required to buy one of the volumes. Participents who have afreedy paid for the proceedings published after the assembly will receive the volume immediatory start printing.

The deadline for receipt of abstracts is 31 October 1982. The deadline for receipt of full texts of papers for those symposis for which papers will be propublished, is 31 January 1983, instructions for preparation of IAHS statracts are the same as for fUGG abstracts. These instructions are given in the ANNEX.

All abstracts will be accessed by the symposis conveners who will arrange them in sessions and forward them to Dr. Liebscher before 1 March 1983. Abstracts will be printed by the Local Organizing Committee in a collected abstract volume which will be available to IAHS registrate in Hamburg.

Travel Funds
A small amount of money to cover partial travel expenses may be available. Delegates from developing countries, key invited speakers, and young scientists will receive priority considerations.

National Reports

IAHS will welcome National Reports and will distribute them to delegates during the course of
the Assembly. It is estimated that 400 copies of each report will be needed.

IANS Social Programme
There will probably be an IAHS reception in the first week and an IAHS dinner in the second week. Probably a terms tournament will be held.

The Dr. J. Floodia Secretary General of IAHS Institute of Hydrology Crowmarch Grifford

sored by UNESCO) 24~26 August 1983

IAHS Symposia
NSI HYDROLOGICAL APPLICATIONS OF REMOTE SENSING AND REMOTE DATA
TRANSMISSION (ICRSDT) (cosponsored by WMO and UNESCO)
18-25 August 1983

A. I. Johnson, Woodward-Ciyde Consultants. Herlaquin Pizza-North, 7600 East Orchard Road, Englewood, Colorado 80111, USA

F. Günneberg, Bundesenstell für Gewässerkunde, Kalserin-Augusta-Artlagen 15—17, 5400 Koblonz, Federal Republic of Germany Co-Convenor:

Papers on research, operational procedures, and training related to remote sonsing and remote data transmission in the general field of hydrology and water resources, such as precipitation, snow and too, surface waters, so involute, water quality, groundwater, coestal and well lands hydrology, water uso, planning, and management. HS 2 RELATION OF GROUNDWATER QUANTITY AND QUALITY (ICGW/ICWQ) (cospon

F. Dunin, CSIRO Division of Plant Industry. P.O. Box 1500, Canborra City, ACT 2601, Australia G Mauhess, Geologisch-Palaeontologisches Instrut, Christian-Albrechts-Universität, Olehausenstrade 40/60, 2300 Kiel, Fed-

(1) Effects of quantitative human activities on groundwater quality (irrigation, recycling of thermally and chemically polluted water, extraction of groundwater, draining activities.

thermaily and cromotally positions and minings.

(2) Influence of hydrological parameters (e.g., permeability, porosity) on direction and extent of transport of chemical pollutants to groundwater.

(3) Penodic and long-term changes of quantity and quality of groundwater.

(4) Groundwater quality parameters as indicators of groundwater flow.

(5) Mathods of quantity/quality studies HS 3 HYDROLOGY OF HUMID TROPICAL REGIONS WITH PARTICULAR REFERENCE TO THE HYDROLOGICAL EFFECTS OF AGRICULTURE AND PONESTRY PRACTICE (ICBW) (cosponsorad by UNESCO)

R Kaller, Geographisches Institul I, Albrech-Ludwigs-Universität, Werderling 4, 7800 Freiburg, Federal Republic of Germany

Cychande, Department of Geography, University of Lagos, Lagos, Nigeria

(1) Regional papers: Latin America and the Caribbean (Amazon, Central America, Caribbean), Africa (Central Congo, Weat Africa). Asta (India-Bangiadean, Southeast Africa, Australia-New Zealand).

(2) Papers on particular topics: evaporation and evapotranspiration; flood forecesting for heavy rainfall; effects of deforestation and sylviculture; tropical soils, hydrological properties and errosion; white quality, importance of groundwater analymentour agime [and geomorphology]; effects of agricultural measures on groundwater quality, adverse effects of fand use on ecology, hydrological computation for water resources development with inadequate data; use of experimental basins to obtain data; characteristic rainfall of tropical storms (time, spatial distribution, ...); water resources management with regard to tropical precipitation characteristics (euch as infgetton, agriculture, reservoir stilling, flood prevention, etc.).

E. Plate, mailtut Wasserbau III. Universität Karlsruhe, 7500 Karlsruhe, Federal Republic of Germany

) Phydrologic processes at the besin scale (including changes due to man's activity).) Hydrological risk and reliability.) The coupling of water quantity and water quality studies. drology of imigated lands. drologic expects of integrated river development.

B. Webb, Department of Geography, University of Exeter, Amory Building, Rennes Drive, Exeter EX4 4RJ, United Kingdom

(1) Global, regional, and local variations in dissolved loads and the factors which influence itude and frequency characteristics of dissolved load records.

(4) The role of disso (5) Effecte of changes in quantifaliya parameters (channel roughness, discharge, etc.) on

IAHS Workmiops Na 6 NEW APPROACHES IN WATER BALANCE COMPUTATIONS (ICSW) (cospo 2-23 August 1983

A. Herrmann, Technische Universität, Langer Kamp 19c, 8300 Braunechweig, Federal Plepublic of Germany (1) Water belance computation techniques: present status of the concepts of water balance models: data availability; scale in apace and time; optimization techniques.
(2) (Stobal, regional and local water balances; world water balances; regional water balances;

HS 7 HYDROLOGICAL ASPECTS OF TROPICAL CYCLONES (ICSW) (cosponsored by

R. Keller, Geographisches Institut II, Albert Ludwigs-Universität, Weldering 4,7800 Finiburg: Federal Republic of Germany

Definition and detalogue of projectal humid areas affected by precipitation from cyclones runolf and flood characterisi these areas; precipitation.

V; Kolfyelkov, Tnettul Geografi, Akademiya Nank SSR, Moscow, USBR G. J. Young, Intend Waters Directorate; Environment Canada; Ottawa KIA OE7, Canada

L. Cyclende, Department of Geography. University of Legos, Lagos, Nigeria HS & GLACIER MASS BALANCE AND HUNOFF (ICSI)

HS 4 SCIENTIFIC PROCEDURES APPLIED TO THE PLANNING, DESIGN AND MANAGEMENT OF WATER RESOURCES SYSTEMS (KWRS) (cosponsored by UNESCO)

G. Golubev, UN Environmental Programme, P.O. Box 30552, Nairobi, Kenya

KS & DISSOLVED LOADS OF RIVERS AND SURFACE WATER QUANTITY/QUALITY RELATIONSHIPS (CCCE/ICWO) (componed by UNESCO)

M. Gras, Electricità de France. Division des Etudes et Recherches, 6 Qual Watter. 78400 Chalou, France

sal components. I dissolved loads in total denudation, the relative magnitude of paraculate and

A. van der Beken, Vrije Universiteit, Pleinlaan 2, 1050 Brussels,

22

(1) Review of acientific programs and knowledge gained in mass balance studies of glaciers during the past 26 years, and the relevance of these studies to major problems of glacier hydrology. Speciar response to climate, and to current and likely future studies of glaciers by the report on techniques of prediction of most fining factorized areas produced by the ICSI working group convened for that purpose, and to consider the indicated directions. by the ICSI working group convened for that purpose, and to consider the indicated direc-tions for most profitable future work in this field, especially as it may relate to mass bat-ence or studies of glacker behaviour.

HS 9 LARGE-SCALE BNOW STUDIES (ICSI)

6 August 1983

A. Rango, Hydrological Sciences Branch, Code 924, Goddard Space Fight Center, Greenbelt Maryland 20771, USA

Review of the progress and discussion of tuture activities of the ICSI Working Group on Large-Scale Snow Gover. The working group will invite selected discussion reports and wel-come open contributions or comments connected with the interaction between anow cover and climate on scales larger than 2500 km²; the large-scale hydrological effects of anow cover, and problems and techniques of regional anow cover management and handling of problems anow indomnition.

H310 THE ROLE OF HYDROLOGY IN WATER RESOURCES SYSTEMS: EXPERIENCES

Co-Convenor:

E. Plate, institut Westerbeu II., Univerenti Kerlsruhe, 7500 Karlsruhe, Føderal Republic of Germany

G. Golubey, UN Environmental Programme. P.O. Box 30552, Nairobi, Kenya

 Evaluation of the experience of countries in the application of results of hydrological and operational research in the implementation of water resources development and management (IHP Project A. 4.3.1). r response that a contribution to the dividing water and sanitation

H311 STRATEGIES FOR HYDROLOGICAL SCIENCES IN DEVELOPING COUNTRIES

N. B. Ayibotele, Water Resources Research Institute (CSIR), P.O. Box M32, Accts, Ghana

Activises of relevance to the developing countries to be included in the Commission/ Committee activities, and how to execute them.
 Expenences with use of mathematical models in hydrology in developing countries.

INTERNATIONAL ASSOCIATION FOR THE PHYSICAL SCIENCES

PARTICIPATION IN JUGG INTER-DISCIPLINARY SYMPOSIA

Symposia under IAPSO loadership
No. 17 Low Lattudo Coupled Ocean/Amosphere Circulation
No. 18 Ridgo Crost Hydrothermal Activity and the Chemietry of Soa Water
No 20 Oceanic and Atmospheric Boundary Layers
No 21 Coestel and Near Shore Zone Processos

isia in which tAPSO hos an interest

4. Geodotic Features of the Ocean Surface and their implications

5. Geophysics of the Polar Regions

6. Data Management

6. Basesment of Natural Hazards

6. If Structure and Composition of the Oceanic Crust

6. Scentific Discoveries from MAGSAT Investigations

6. Remote Sensing for Clemate Studies

6. Sea for Margins

6. The Ocean and the CO₂ Clemate Response

IAPSO GENERAL ASSEMBLY

The international Association for the Physical Sciences of the Ocean (IAPSO) General Assembly will be hold concurrently with those of other IUIG Associations in Hamburany, 15—27 August 1983. The following is a telling of IAPSO symposia and other pertaining to the IAPSO Assembly.

National Reports
IAPSO will wolcome National Reports and will distribute them to the delegates. It is estimated that 350 copies of each report will be needed.
Business Meetings
IAPSO plans to hold its first Plentry Bession on the alternoon of Monday, 15 August, and its second Plentry Session on the morning of Thursday, 27 August 1983, at which times the pestionnal Address, exports of Commissions, election of officers, adoption of resolutions and other matters will be taken up. An agenda of these montings will be sent to all National Correspondents.

Submission of Abstracts
Most papers will be traited, but contributed papers will also be welcome. Any ectentist wishing to present a paper in any IAPSO symposium should send a copy of his/her abstract to the appropriate convenor for acceptance. A socond copy about be sent to the Service et al. mailed in guithclant time to service not later than 15 March 1983. Names and addresses of the convenors are included on the following pages. The abstracts should contain the actentic content of the paper and the lest should not erceed 300 words instructions for preparation of IAPSO abstracts and the acting as for IUOS abstracts. These instructions are given in the ANNEX. All abstracts will be screened by the convenor who will arrange them in sessions and forward them to the Secretary General, to arrive before 15 April 1983 Abstracts will be printed by the German Organizing Committee in a collected abstract volume which will be available to IAPSO registrants in Hamburg.

Travel Funds A small amount of money to cover partial travel expenses will be available for a lew key

Additional information ams and activities may be obtained from

San Deco, California 92107 U.S.A.

IAPSO Symposia PS 1 Effects of interfacial processes on the body of the ocean

Rayles and discuss recent results regarding basic processes of physics, chemistry and geol-ony governing the oceanic cycling of substances including consideration of fluxes involved. Starting with an overview of various interfeces in the system, such as land, see, alress, sediment-water, different oceanic regions should be co 10° to 10° or 10° years.

Professor G. B. Kullenberg, Institute of Physical Oceanography, University of Copenhagen, Harakisgade 8, 2200 Copenhagen N, Denmark

Dr. Roger Chesselet, Centre des Fatifes Radioectivités, Labora-toire mute CNRS-CEA, P.O. No. 1, 91190 Gri-sur-Yveité, France

Dr. D. Schink, Department of Oceanography Texas A and M University College Station.

Dr. Scott Fowler, IAEA Laboratory, Monaco

PS 2 Large scale dynamics and circulation in the ocean.

This symposium will review in depth the recan observations, theoretical and numerical modeling advances in understanding the large scale ocean processes and circulation. Structures from the scale of midocean eddles to that of the world ocean are involved. Topics to be considered include eddles and their role in mean circulation, strong features such as boundary currents, their meander sand detached rings, and large scale variations of properties, notably heat, in the ocean by address and mean occutation. Part of the symposium with devoted to invend cavinary of major field experiments of recent years (POLYMODE, NOR-PAX, MOSK, ISOS, etc.)

Dr. William R. Holland, NCARI, P.O. Box 3000, Boulder, Colorado 80307 U.S A. Professor A. S. Monin, Insulate of Occanology, Azademy of Sciences of the U.S.S.R., 23, Krasikova Street, Moscow, 117218, U.S.S.R.

Professor W. Krausa, Instant for Moderstunde an der Universität Kiel, Düstembrocker Weg 20, D-2300 Kiel, Fed. Rep. of Germany P3 3 intentedials scale motion and structures in the ocean Scales of notion from the oceans synopile scale (the intent structure and dynamics and thermodynamics of eddles, upwelling and downwilling, and intense currents) to the oceans; mesocials (fronts and long internst waves in association with eddles, upwelling and down-reting, and intense customs) plus been and storm surges, together with liner boundary

2 day sessions. Conveners Professor C. N. K. Moorrs, Department of Oceanography, Naval Postgradulate School, Monterey, California 83940, U.S.A.

Dr. Ort. Olbers, Max. Planck Institut für Meteorologie, Burdesstraße 85, D-2000 Hamburg 13, Fed. Rep. of Gérmany

PS 4 Smell scale motion and privatures in the sceen internal water motostructure of safety and internal water, turbulence on acases of lates than 100 meters; microstructure of safety and internal water have the to harbulence and pix-Professor Michael Grags, Applied Physics Laboratory, University of Washington, 1013 N.E., 40th Street, Beautie, Washington 98105, U.S.A.

PS 5 Oceanographic problems of the North Sea and Baltic Sea

This symposium will address itself to theoretical and experimental results on dynamic procases in the low irequency range such as residual currents, knot-burnt mixing and exchange
processes, water and heat balance, and the rote of shallow water fronts of the Baltic and the
North Sea.

1 day sessions.

Convener:

Bulleting G. Venues basted to the contraction of the Convener.

Prolessor G. Krause, instarl für Mearesforschung, Brømerhaven, Am Handelshalen 12, D-2850 Bremerhaven, Fed. Rep. of Germany Professor A. Alisam, Institute of Thermophysics and Electrophysics, Estonian SSR Academy of Sciences, Paldiski Sir. 1, Tallinn

PS is Desanographic advances from new technologies

Important progress in understanding ocean physics olten follows from, or capitalizes upon, technical developments which attord wholly new types or greatly increased quantities of oceanographic observations. This sympostum will consider recent results from such developments and prospects for further scientific advances. Emphasis will be on critical examination of scientific uses rather than on technology or angineering per se. Satellitie oceanography and scoulic remote sensing of oceanic motions and structures are two of the developments to be discussed.

22 day seesions.

Dr. R. E. Stevenson, Office of Neval Research, Scripps institution of Oceanography, La Jolla, California 92093 U.S.A.

Akad. B. A. Nelepo, Marine Hydrophysical Institute, Ukrainian BSR Academy of Sciences, 27 Lenin Street, Sevasiopol, U.S.S.R.

Dr. P. Scully-Power, Naval Underwater Systems Center, New London, Connecticut 08320, U.S.A.

PR 7 Marine ontice and optical modeling of the upper Costan he opuse any open-al dynamics of the upper ocean; modeling of physical/chemical/blological and opu-tionalise of the upper mixed layer, radiant energy in the marke environment; be d temporal variations of the optical properties of the ocean; marke photoeology and involving of reliming productivity; marke optics and its application to other

Dr. R. C. Smith, Department of Geography. University of California, 5707 Elilaon Hall, Santa Barbara, California 93106, U.S.A.

3/2 day sessions

3/2 day seesions

Dr. A. Morel, Laboratoire d'Océanographie Physique, Université de Paris, Quai de Darse, 006230, Villefranche-sur-Mer. France

P8 8 Chemical fluxes in the water column Fluxes of elements, organic maller, and radionuclides as obtained from particle intercep traps and in alta fibration methods will be considered; intercelloration experiments and refe e to processes of sedimentation will be discussed.

Dr. S. Krishneswami, Physical Research Laboratory, Navrangoura, Ahmedabad 380009, India Dr. M. R. Bacon, Woods Hole Oceanographic in Woods Hole, Messachusetts 02543, U.S.A.

P8.9 Deep and bottom water formation and circulation and topographic effects.
Consideration of the several regions in which, and processes by which, deep and bottom water masses are formed in the world ocean; subsequent spreading, mixing, and circulation of these waters; topographic effects on their circulation.

Professor Knut Aegaard, Department of Oceanography WB-10, University of Washington, Seattle, Washington 96195, U.S.A.

PS 10 Seesonal and interangual variations in the oceans and almosphere Seasonal and longer period (years but not decades) variations in the oceans and atmosphere, and the physical links between them. Large scale benodinic ocean response to atmosphatic forcing. See surface temperature variations and short period climate changes.

Convenor:

Professor Henry Charnock, Department of Oceanography,
University of Southampton, Southampton S09 8NH, England

PS 11 Physical, chemical and geophysical oceanography (Précis and poster sessions mical and geophysical oceanography (Precia and poster a, underwater ecoustics, radiant energy, water motions, che an, godogical structures, small bodies of water.

Dr. E. C. LaFond, LaFond Oceanic Consultants, P.O. Box 7325, San Diago, California 92107, U.S.A. Professor Arturo De Maio, instituto Universitario Navale, Faccità Di Scienze Nautiche. г восна и эснице манисле, latitulo Di Meteorologia E Oceanografie, I-80133 Napoli, Via Amm. Acton, 38, Italy

Dr. E. G. Morosov, institute of Oceanology, Academy of Sciences of the U.S.S.R., 23, Krasikova Street, Moscow, 117218, U.S.S.R.

Professor 8, H. Sharaf-el-Din, Oceanography Department, Faculty of Science, Alexandria University, Alexandria, Egypt PB 12 Teunami wave propagation (cosponatored by IASPEI)
Results and theory of tsunami wave propagation in the ocean and related setamic waves.
Prediction and mitigation of tsunami effects will be included.

Professor T. Y. Wu, California institute of Technology 104-44, Pesadena, California 91125, U.S.A. Professor S. L. Soloviev, frattute of Oceanology, Academy of Sciences of the U.S.S.R., 23, Krastkova Street, Moscow, 117218, U.S.S.R.

INTER-UNION COMMISSION ON THE LITHOSPHERE (ICL)

PARTICIPATION IN IUGG INTER-DISCIPLINARY SYMPOSIA

Lithospheric Deformations
Crustal Accretion in and around testand

Geophysics of the Polar Regions Data Management Assessment of Natural Hazards Time-Dependent Processes and

inter-Dependent Processes and Properties in Planetary Meterials tructure and Composition of the Oceanic Crust taleau Light, Ritts and Volcaniam indige Crest Hydrothermal Activity and the Chemistry of Seawater

whiter, and Dynamics of the Continental Lithosphere
The continental lithosphere exhibits many large scale structures
connected with deep seated processes. These are more complex connected with deep seated processes. These are more compre-tion the simple scheme of piate tectonics proposed for oceanic plates. They govern such geological surface phenomene as rif-ing, aptrogenesis, basin formation or mountain building. Their understanding requires the study of physical and compositional understanding requires the study of physical and compositional properties. The dynamical modelling critically depends upon a good appraisal of the stress field produced by plate boundary interactions and internal density haterogeneities. This aymposium will therefore welcome relevish

Inis symposum will theletice welcome relevant contribut from various fields: material science, patrology, geochemic salsmology, gravimetry. It will particularly encourage pres attons deating with correlations of the various observables modelling of the thermal and mechanical processes control the lithosphere evolution.

The state of the second and the state of the state of the second and the second a

Dr. Ctaude Froidevaux, Leboratoire de Geophysique. Université Paris, Sud, Bálimant 510, F-91405 Oreay, France

Dr. Karl Fuchs, Geophysikalisches Instr Universität Karlsruhe, Hertzeiraße 18, D-7800 Karlsruhe, F. R. Germany

Dr. Peter Wylle, Department of Geophysical Sciences, Unive of Chicago, 5734 S. Ellis Avenus, Chicago, IL 50537, USA

2. Passive Continental Margins
1.) The Crusial Structure of Passive Continental Margins:

— Early rifting history of passive continental margins;

Shallow and deep crustal structure of
i) stretched and normal faulted passive continental margins,
ii) and of passive continental margins which are characterized by massive outpouring
of volcario meterial resulting in the formation of witnehouse wedges of "oceanward
dipping subacoustic baseriers reflectors" and/or volcanio build-fues;

— Physical and chemical composition of the stretched crust at a passive continental margins,
skr;

lature and algorificance of geophysical "edge" animalies (gravity, magnetic, heat - Nature and origin of the Magnetic Cutet Zone (MCZ);
- Validitions in valocity structure, thickness, physical and chemical properties across payable confinental margins.

2.) The Evolution of Passive Commental Margins:

History of vertical movements (upit) and subsidence) at passive confinental margins during their evolution.

Transition of the lactorio movements across a passive confinential margin; A STREET, ST.

- Nature, composition and tectonic movements of piateaus at passive continental mas gire; Thermal and mochanical models for the evolution of passive continental margins.

3.) "Global" unconformation and the synchronoity of toclonic and son-level events at passes Dr. Karl Hinz, Director and Professor. Stillewog 2, Positech 51 01 53, D-3000 Hannover 51, Fed. Rop. of Germany

Dr. Lucien Montadert, institut Français du Pétrolo, B. P. 311, 92502 Ruell-Malmaison, Franço

den and Hercynian Fold Belts syntan Fold Betts
Modern study of progonic bolts places increasing emphasis on
the integration of geological observations on surface rocks with
geophysical observations of deeper rocks and particularly of the
depth dimension of geological structures. For example, in the
case of the Appalachian and Heroynian Betts, rocent studies by
seismic reflection profiling have given strong support to hippothases involving thin-skinned thrusting as a major component of

This symposium will bring together scientists from opposite sides of the Atlantic and from the disciplines of gootings and goophysics to provide a comprohensive discussion of recent evidence and modern views on trose important and enigmatic progenic ball.

three half days Prof. Dr. H. J. Bohr, Geologisch-Palsontologisches Institut

D-3400 Golfingen, Fed Rep. Germany Prof. Dr. J. Oliver, Copt. of Geological Sciences, Cornell University

Prof. Dr. H. Zwart, Institut voor Aardwetenschappen, Rijksunivailoii Uvechi. 3udapastiaan 4, NL-3508 TA Uvocht, The Netherlands

4. Desert Engroaphment, Fast Tropical Ergsion, and Cossial Subsidence and Submergence The last few million years of Earth history have been characterised by rapid changes in su-

Cornell University, Kimbali Hali, Ithaca, N. Y. 14583 0125, U.S A.

The fast few million years of Earth history have been characterised by rapic changes in succeeding each as the extension of ice shoots in high labitudes, the corresponding plate-tion in middle latitudes, the migration of deserts and rainforests in low latitudes, and the con-sequent acceleration of erosion rates as vogetation was disturbed.

This symposium locuses on the four most dismatic geological processes of the Qualitary era. The contributions will aim to quantify our undorstanding of rates of change over various lime scales (10²— 10³ y) that prevalled over broad regions. Such an historical perspective provides a reliably documented basis from which to assess the probable course of has events. As well this broad scalonal consequence of lituating the variety of local responses to events. As well the broad regional acops serves to illustrate the variety of local resp

given perturbation.
This interdisciplinary overview draws upon the wide range of studies encompassed by the INOUA Commissions on Shorelines, on Neotectonics and on Paleoclimatology, together with IGCP Projects on Sea Level, Gisciations, Paleohydrology and Floods 4 half-days.

Prof. C. Fubara, Department of Surveying, University of Nigeria, Naukka, Nigeria

Prof. H. Faure, Facultó des Sciences de Luminy, Case 907, 13288 Marsoille, Cedex 2, France

Submission of Abstracts
Scientists wishing to present a paper in any ICL Symposium should sond the original abstract to the Secretary General and a photocopy to the appropriate Convonor for acceptance. Abstracts should be masted in sufficient time to arrive no later than 1 March 1983. Instructions for preparation of ICL bettracts are the same as for IUGG abstracts. These instructions are given in the ANNEX. All abstracts will be screened by the conveners who will arrange item in abstracts with the minute of the Secretary General.

Abstracts will be printed by ihe Local Organizing Committee so that they will be available to registrants in Hamburg. Submission of Abstracts

Additional information
Additional information on ICL programmes and activities may be obtained from the Secretary

ANNEX 1

IUGG INTER-DISCIPLINARY SYMPOSIA RESPONSIBILITIES OF THE CONVENORS AND ASSOCIATION REPRESENTATIVES General Responsibility General Responsibility
Every convenor is assisted by Association Representatives. They are allowed by Association Representatives. They are allowed by Association for the satisfactory conduct of the Symposiums.

The selection of Invited speakers and papers.
 The collection of abstracts from which they will operate the screening of papers offer.

s delivery of all the ababacts (IUGG Inter-disciplinary Symposia only) should be sent to Local Organizing Committoe IUGG 1983 Hamburg Massa und Congrass GmbH -- Congross Organ Positech 30 23 60

sking Care that they all will be received before 1 May 1983 I le strongly recommended to utilize the adopted format. They will refer therefore to the instructions resured by the Organizing Committee a copy of which is because

They will role therefore to the instructions teaucu by the Organizary Committee will post to all conveners 50 sheats of the adopted forms!

The local Organizing Committee will post to all conveners 50 sheats of the adopted forms!

Kooping speakers to their allotted time.

The distribution to all contributors of the instructions for delivering the talk, for preparation and presentation of slates and menuscripts.

The quality of the end presentation of each paper. The Union strongly emphasizes the fact that many in the audience have native tengues other than English or Franch. Therefore the speakers must speak is bowly and very distinctly. The Conveners must sheek had the speakers are clearly understood in the back rows of the room. This is the most important recommendation from the Brequitye Committee of the Union.

Each Convener must prepare, by the end of the work when his Symposium is hold, as abstract of 2 to 6 pages long describing the highlights of the Symposium, the state of the each convolor must propage, by the on or vice vyok when his symposium a abstract of 2 to 5 pages long describing the highlights of the Symposium, the state of the problem and the future developments to be expected in the light of the Symposium's de-cussions. A list of presented papers can be given in Appendix but does not constitute any way a report on the Symposium. This abstract will be published in the Chronids. A rapid publication is obviously of mejor importance.

Screening and Presentation of Papers
— Screening should be based upon the scientific merit of the paper, new ideas, new resu (Except for papers from Takyanoso scientists) no papers will be read unless the suthout

This is the reaconability of the Conventor.

Pre-distribution of syntact papers should be attempted.

An abstract of one page must be prepared for the Abstract volume as well as to allow a objective judgement to be made on the quality of the contributed paper.

Pre-seatibles with visual aids should be limited to about one side per two minutes. Careful instructions are given below to hours that the material can be shown and read without delaying or detracting from the presentation.

Timetable

There must be no change in the day of session or symposium once it is published.

Allerations in the speaker schedule will be allowed. Such changes must be endounded Accentral place will be used for these changes by all Associations and Commissions.

It is up to convenors to establish their own rules of time maintenance within the published programme. Convenors could adopt discussions, reserve papers, etc. as needed. At different places there will be information boards and these may carry the delay programme. They would reflect the latest timetable information on speakers and sessions. Convenors must supply title timetable to the Local Organizing Committee so that it is possible for everybody to plan his activity and attendance.

Assembly of Abstracts
The Abstracts should be assembled by the Convenor in a desired order, preferably reflective
the anticipated order of presentation. No blank pages are to be inserted for obstracts of
available at time of posting. The assembled order must be letted by the Convenor on a selfste typewriten sheet and posted with the assembled Abstracts. According to this order
ste typewriten sheet and posted with the assembled Abstracts. According to this order
ounder must be assigned by the Convenor to each paper. This number will be inserted
together with the Symposium number in the left corner of the Abstracts by the LOC.

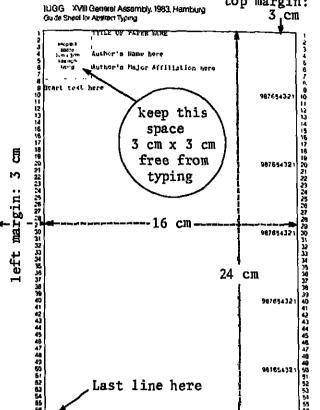
Positing

All IUGG Inter-disciplinary Symposis Abstracts should be sent AIR-MAIL First Class for Convenues to the Local Organizing Committee (address are above) so that they was received before 1 Mai 1963, it is strongly recommended that the Abstracts be protected plastic film and carolocard to prevent any damage. It is turther recommended that advice the dispatch be sent by independent means such as airmail letter or telex.

ANNEX 2

INSTRUCTIONS FOR PREPARATION OF ABSTRACTS
The NIGG inter-disciplinary and Association Gymposia Abstractd will be printed by the office process disciply from the authors' manuscripts and reduced to A6 size paper. In order to the

fitate this process the formet must be standardized as set out below. Please note that all automissions will be photographed directly. There will be no opportunity for correction, and poorly prepared Abstracts may be rejected. Thus you are asked to take the utmost care. Deadline for receipt of IUGB inter-disciplinary Symposia Abstracts at the Convenor is 16



This page is 63 PICA 10 characters with

Deadline for receipt of Association Symposia Abstracts is 15 March 1983, unless otherwise announced by the Associations and in this Circular. Abstracts received after the deadline will not be accepted.

Use of the Guide Sheet
A guide sheet is included in this Circular. All text and issustrative malenal should not exceed one page and must be contained within the guilnes of the guide sheet. Other size forms must not be used. Please use white paper of A4 size (21.0 x 29.7 cm) If A4-size paper is not available, you may use 8.5° x 11° paper, which is 0 6 cm wider than an A4 sheet. Neps 3 cm margin on the left and 3 cm on the top side of the paper. As the Abstracts will be photographed directly the constraint of the Abstract is required to be produced with the utmost care to

tollowing the subsequent guidelines:

I. An electric typewriter should be used, if possible, with 10 characters per inch. Type bars should be clean. A carbon ribbon should be used, if possible, otherwise a reasonably now.

Carbon paper or other copies cannot be accopted.
 Garbon paper or other copies cannot be accopted.
 Begin paragraphs at left margin and use single spacing, but allow double spacing between

4. The title of the paper, the name(s) of the author(s), the institution and country should be typed directly onto indicated tines (see example given below), with 3 cm ind the left edge of the typing area (i. e. 6 cm from the left edge of the paper).

ADIB: TSUNAMI PROPAGATION IN THE PACIFIC OCEAN

M. Engel and W. Zahel
Institut for Meereskunde, Universität Hemburg
Federal Republic of Germany

5. If you include illustrations, they should be timely mounted in their proper places. Figure rs and captions should be typed in the desired place near th ations, photographs must be prepared with good contrast on glossy linksh paper and should have the same range of density. Lattering should be clear (black or white). Line distributions compared to the contrast or proper or the contrast of the contrast of

drawings.

8. Abstracts may be submitted in either of the official languages, French or English.

7. If you need to fold Abstract sheets, ploase fold carefully between the typod fines, so as to produce no damage on typed lines or illustrations.

8 For IUCG Inter-disciplinary Symposia, send all Abstracts AR-MAIL First Class to your refevent Convency, as settled in this Circular, it is recommended to advise of the dispatch.

For Association Symposia, please see remarks below.

IAG: Deadline for receipt of abstracts is 1 March 1983. Send all abstracts AIR-MAIL First Class to the Secretary General. It is recommended to advise of the dispatch but appeared to latter.

First Class to the Secretary General, it is recommended to sowice of the dispation by separatile feiter.

One photo-copy of your abstract should be sent independently to your convenor of Symposium and to the President of the concerned Section.

The Abstracts will be reviewed by a Committee consisting of the Presidents of Sections and the authors will then be informed of the decision concerning their

Deadline for receipt of abstracts is 16 March 1983. Send your original abstract to Describe for receipt of abstracts is to reserve 1943. Send your original abstract to the Secretary General, and a photo-copy to the convenor.

Deadline for receipt of abstracts is 15 March 1983. Send your original abstract to the Secretary General, and a photo-copy to the first convenor concerned.

Deadline for receipt of abstracts is 15 March 1983. Send your original abstract to IAGA: the Secretary General, and a photo-copy to the first convenor concerned.

Deadline for receipt of abstracts is 1 March 1983, Send your original abstract to
the Secretary General, and a photo-copy to the convenor.

Deadline for receipt of abstracts is 31 October 1982, (see description of IAH8

programme) Deadline for receipt of abstracts is 15 March 1983, Sandyour original abstract to the Secretary General, and a photo-copy to the appropriate convenor Deadline for receipt of abstracts in 1 March 1963, Send your original abstract to the Secretary General, and a photo-copy to the appropriate convenor.

ANNEX 3

GUIDE-LINES FOR AUTHORS/SPEAKERS

ulds-Unes for Delivering the Telk Get in touch with your seasion Chairman upon your strival and not later than 24 hours before the sussion in order to confirm your participation and to enable him to establish the final-table, which he will communicate to the projectionist.

2. Don't read, just glance once in a while all your written "oral" version Learn this version well.

Don't hurry to make a point. If you work from a set of notes that you've prepared from tho "oral English or Franch" version of your talk, your pace will be such that your audience will

a single essential message to your audience. Let your talk reflect your personal angagement in the subject giving the audience a chance to grasp your fundamental ideas for better understanding of the scientific content of your

S. Use short sentences; pause between Ideas for the digastion of facts.

4. If this is your first talk, memorize your introduction. By the time you're through this part, you will be used to your surroundings and the aude 6 Don't overrun your time. Practice en accelerated ending: then when the timer warns you that your time is nearly finished, go into your concluding remarks.

You are asked to bring a copy of your manuscript to the Meeting for subsequent publication in the Proceedings. In general, the length should be no more than about 20 manuscript pages

(21 x 28 cm, 25 lines to the page). Manuscripts should be typed double-spaced on one side only, with litle, author's name and institution at top. They should be complete with litustrations and must include lists of references and figure capitons.

Keep it elimpie. Unless the material or the slide can be comprehended at a glence, it defeats its own purpose. A slide should not have on it detail that is not needed or deta that are not rolemed to in the talk. A slide should be limited to the presentation of one idea. Try to express one idea per slide, and use more slides rather than combine too many ideas on

ary ore side.

2. Keep it undustrated, lituratations interested for publication are seldom suitable for side presentation. Fill the entire area svaliable but do not cutter the side with needless detail, a. Make the curves or important outlines heavy.

b. Blimhate the tegend if possible. Label curves or use colour instead.

c. Reduce number of words on a side to 15 if possible.

d. Ornit explanatary detaits, supporting data, tables, etc.

a. Avoid jables; use a graph or a simple fine diagram.

3. Plun your slides as that they are legible. Some useful guidelines are:

— Sides should be readable when held in the hend at a distance of 25 cm from the aye.

— A convertent procedure is to type into an area threa times as large as the actual slide (i.

e., 75 x 106 mm). Capital letters should be 2.5 mm high (Pica size), and no more than 5 lines should appear on each slide.

In preparing transparencies for an overhead projector, use capital letters from 1 to 2 cm high. Lines should be 1 mm wide.

Use colour. Colour stracts attention and enhances the litteration. Different zones of a map can be separated more easily with colour and curves can be distinguished more easily.

Avoid large areas of white background which produce glars and eyestrain. This can be eliminated by using a soft colour thit over all.
 Use standard size and format. Only 5 cm x 5 cm slides will be accepted but overhead pro-late and the profession.

6. Use elendard size and commer. Only a cm a comparison and account of the place of the jectors will be available.
7. Label and number your slides properly
a. Thumb-apot should be well marked in the lower left-hand corner on the face of the slide when held in the right reading position. In this position the slide number on this trumb apot will appear inverted. Spots should be placed on mask. Then the slide number will appear in the right upper corner when the slides are stored in the projector cases.

sents.

Sides should be delivered in boxes labelled with the speaker's and symposium's name, date of session and paper number. Sides should be numbered consecutively with each number appearing any once.

Chapticals sides, numbered in proper order, must be provided if you wish to show the same illustration more than once during your talk.

resentation of Sädes.

Where and when to hand in and to withdraw your slides.

The projectionist will be at your disposals in the meeting room 30 minutes before the announced slaring time. He must have all slides no later than 15 minutes before the season starts in order to fit the slide container. The projectionist is not permitted to accept or return slides during the sossion. Withdraw your sides from him at the end of the session, or bollore the following session o

the same meeting.

2. When the alide is first put on the screen, allow the audience several accords to study the alide before taking about it. The audience can't study the side and later to you at the same time. This is another reason for keeping the side simple — if the side requires extended study, the audience must choose between understanding the side or listening to you. Never use sides to show extensive formula deductions.

3. Have contact prints made of your sides. They can be numbered and out in their proper order in your notes. They you won't have to turn your back on the audience and loss "microphone contact."

Name of large (dentifying letter or character or colour on the sade that cells attention to the festure you wish to point out. This obvisios the need for a pointor.
5. Use each slide only once, if you must refer to the same slide at different times in your talk, use a duplicate slide You will not be able to recall a slide after you've passed on to the 8. Be prepared to lump over some of your stides and go directly to a concluding slide if you is

running short of time. Have this "jump to" allde Labbed and know its number so you can lell the projectionist without having to flesh through intermediate stides.

Projection Facilities Equipment for stade presentation (50 mm x 50 mm frames) and overnead projection will be available. If 8 mm or 16 mm Illim projections (only a limited number of projectors is available) or twin alide projectors should be needed the authors are required to inform the Local Organizing Commis-ted before May 1st, 1983

Geophysical Year

The complete Geophysical Year last appeared in the December 21, 1982, Eos. A boldface meeting title indicates sponsorship or cosponsorship by AGU.

New Listings

May 1983 Sixth World Conference on Ozone, Washington, D. C. Sponsor, International Ozone Association. (IOA, Tower Suite 510, 301 Maple Avenue West, Vienna, VA 22180.1

May 2-27, 1983 Ninth World Meteorological Congress, Geneva, Switzerland. Sponsor, World Meteorological Organization (WMO, 41 avenue Giuseppe Motta, Case Pos-tale 5, CH-1211, Geneva 20, Switzerland.) May 9-13, 1983 17th International Symposium on Remote Sensing of the Environ-ment, Ann Arbor, Mich. Sponsor, Environ-

mental Research Institute of Michigan.

(ERIM, P.O. Box 8618, Ann Arbor, MI 48 IA7.A May 16-20, 1983 Sixth Congrès Mondial pour la Qualité de l'Air, Paris. Sponsor, Union Internationale des Associations pour la Prévention de la Pollution Atmosphérique. (UIAPPA, 62 rue de Courcelles, 75008 Paris.) June 12-25, 1983 Seventh Annual Conference, Kingston, R. I. Sponsor, University of Rhode Island, Center for Ocean Management Studies. (Center for Ocean Manage-

ment Studies, Kingston, RI 02881). June 1983 Ninth Conference of Aerospace and Aeronautical Meteorology, Omaha, Neb. Sponsor, American Institute of Aeronautics and Astronautics and American Meteorological Society. (AIAA, Meeting Department, 1290 Avenue of the Americas, New York, NY 10019, or AMS, 45 Beacon Street, Boston, MA 02108.)

September 19-25, 1983 International nposium on the Geology of the Taurus Belt, Ankara, Turkey. Sponsor, The Mineral Research and Exploration Institute of Turkey and The Geological Society of Turkey. (Maden Tetkik ve Arama Enstitüsü (MTA), Toros Jeolojisi Uluslararasi Simpozyumu, Düzenieme Kurulu, Ankara, Turkey.) October 17-20, 1983 15th Annual Meet-

ing, Ithaca, N. Y. Sponsor, Division for Plan-

etary Science of the American Astronomical

ing, Cornell University, Ithaca, NY 14853.)

Society. (Steven J. Ostro, Space Science Build-

Changes

June 13-15, 1985 International Sympolum on Gas Transfer at Water Surfaces, Sec Geophysical Year, Eas, December 21, 1982. The symposium is being supported by the Environmental Protection Agency.

1982 New Member

** ** **

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Sponsors One hundred and forty-six new members were elected in November 1982. The AGU

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DuBois, Three Mem-

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rie.
Ken C. Macdonald; John F. Mann, Jr.;
J. C. Mareschal; Konrad Mauersberger; Lisa
McBroome; Michael McPhaden; Robert L.
McPherron; Ronald Merrill; John W. Miles;
Gary L. Millhollen; Stephan Mueller; Shlomo Neuman, Adnan Niazy, Kent C. Nielsen: Chuck Nittrouer; Bert E. Nordlie; William A. Olsson, Risto Pellinen, Rachel T, Pinker;

2500 항상 내내가 하는 전 성명적 그 전체들이 불편하는 하는 이번 경 방향을 내려가 되는 이번 것 같다.

son; Glenn R. Roquemore; Joseph S. Rosenshein; Robert F. Roy; James E. Russell; Jason Saleeby; Richard Sanders; Verne H. Scott; H. W. Shen; Donald C. Signor; Susan C. Slaymaker; J. D. Smith; Hartmut Spetzler; Joseph M. Steed; A. E. Stoddard; C. Sucksdorff; J. Timothy Sullivan; J. Craig Swanson George A. Thompson; Brian B. Turner; Albert J. Valocchi; A. J. Van Der Weele; R. P. Von Herzen; Francis G. West; J. L. Whitford-Stark; John A. Wood; William Yeh.

Membership Update

The following individuals have been added to the list of Supporting Members which was last published in the November 30, 1982,

Life Supporting Member

A. Ivan Johnson.

Individual Supporting Members Frank C. Ames, Kinsey A. Anderson,

Charles C. Counselman III, Charles L. Drake, Peter S. Eagleson, E. R. Engdahl, Robert D. Fletcher, William C. Graustein, John A. Knauss, Worth D. Nowlin, Jr., Joseph L. Reid, Claes G. H. Rooth, William B. F. Ryan, Kenneth C. Spengler, Thomas W. Stern, George H. Sutton, M. Nafi Toksoz, Richard

Membership **Applications** Received

Applications for membership have been re-ceived from the following individuals. Their proposed primary section affiliation is shown

Regular Member

Michael E. Bentley (H), Hugh E. Bevans (H), Alan Brandt (O), Philip Durgin (H),
Terry L. Erlewine (H), Ronald J. Ferek (A),
Robert W. Gillham (H), Donald R. Hastle,
Forrest M. Holly, Jr. (H), Paul A. Hwang (O),
M. Aslam Khan Khalli (A), T. Kurtis Ryser (V), Richard J. McClimana (H), Patrick N. McGuire (H), Peter A. Mock (H), Robert J. Reed (T), Michael E. Schlesinger (A), Kai Sorensen (T), Bernhard Storre (V), Garth Ronald Prinn; Belh Quinlan; Donald L. Red. Van der Kamp (H), Carol A. Whitaker (H), dell; Randall M. Richardson; Allan R. Robin- T. M. L. Wigley (A), Alex K. Williamson (H)

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May 1, 1983

462-6903 800-424-2488 outside the Washington, D.C. area Application Deadline

Student Member

Sharon Deemer (H), Raymond Cahan (S), Huseyin G. Iz (G), John R. Nelson (T), Ray G. Peterson (O), William K. Witte (T) Associate Member

E Russell Johnston, 111 (H)

网络人类原数 医多色膜炎 提展的 超级 化硫酸盐

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Exploration Geophysics

ABC AREA
J.H. Fillows (Scripps Institution of Oceanography,
Inhversity of California, La Johia, California, 3901)
The seafloor signatureljuric soundings have been
gesformed in the mariams island are and subduction
area. Use first (Station 1) in the Nariana trough poor
HIGE hole 434 (position 10° 01°), 145° 12°E, dayth
1770 m), the second (Station 2) in the Greener Chain,
mear HIGE hole 440 (position 18° 06°N, 146° 45°L.

death labe mi.

hear lieb note any special depth look of the conductivity beneath the postulated the state of the second appears to be undaght 1802 m). The steamer through appears to be unexpending some of the Airiana trough appears to be unexpending some of the Airiana trough appears to be unexpectably low in the uppear do in, increasing slowly and roughous test to 18 m² at 700 km. It does not stappay any significant feature such as ithosphere-authoryshers on phase transition boundaries. The character of this profile differs considerably form those fails as brillow structured generally coder, and implying less active regretting from the way of the structured generally coder, and implying less active regretting from the upper to the greater depth we may be two contribute in part to the greater depth we may be the Markama trough compared to that of the min occanic beams. No indicate of the stad of stematice may be concentration of the kind detected on the Pockfic bise at 21% is recognizable in the Marentic due, this fact, however, may simply count from the distance between Scation 1 and the approaches sate is 50 km. A causalous spountation on the cause of the Maylied overall low conductivity values is pomented.

The 1% conducting from the formance basing points to it were high conducting in the furnace upon counts well as contains for a function of a redenied (2) indepared to high conducting in the furnace upon counts well to be a possibly indicative of a redenied plant are subducted with no lineate may also flay a reliability little conducting materials televour to represent the which also and also are trained at the conducting materials televour to represent the wining and or and the process of the mining and or and

ducting materials televed to represent the minking 420 km depth austrained over 100 km, followed by a Georgias, Manuar, Set., Val. 27, AST

DAYS TECTHOGRAPHIC MERYADOS
DIRECT INVESTORS OF DIRECTIONAL MACHITOTELLIBIE DATA
S.ComcEngineering Geneticutes Croup, Department of
Magariale Science and Mineral Engineering.
Iniversity of California, Berkeley.Co. 94720),
F.Owercia and M.Macklavicz
It is shown that the conductivity profile of a
layered earth can be obtained directly (non-iteratively) from one dimensional magastroctium:
Observations.The approach we use is based on the
Bors approximation to the electric field integral
equation.We apply the inversion algorithm to two
data sata.The items was in amalytic, and we are
able to show availytically all the scape in the
inversion ofgories.The resulting conductivity
profile is so edequate approximation to the actoal profile.The second data may contain the appasent resistivities from a particular field site
at 31 frequencies and the resulting conductivity
profile to consider the direct inversion of two
discontinual magnetotal luric data.
J. Geophys. Fea., Rai, Raper 181837

Geochemistry

1410 Chambetry of the Atmosphere SELECTED MAN-HADE ELECTRIMITED CHEMICALS IN THE AIR AND OCCASIC ENTERONOMY Hamman 3. Stugh, Lote J. Salam, Johin Z. Stiles

Heavent 3, Singh, Louis J. Salam, Robin Z. Stilas (Attoupherke Stimme Center, SRI International, Meanlo Fark, California, 9402)
Latitudiral diatribution (4004 to 3203) of a master of synthetic balogemented species show that for unractive species (1.e., fluorosaban 12(F12), Fil, F131, F131, F131, SR, and Ctil), the northway bendapheric (WI) Surden is only 3 to 10% higher than the southern handspheric (SH) value. The mean kM/SH consumeration ratios for 1,1,1-trichlorosabans, dichlorosabans, chleroform, 1,2 dichloreshans, and targetionsochans are found to be 1.34, 1.89, 1.90, 2.64 and 5.80, respectively. When compared with available emissions data, the atmospheric badget of these species are compatible with atmospheric badget of these species are compatible with atmospheric badget of these species are compatible with atmospheric badget (1004) (1004) 60 (1002), and 0.8(10.2) for 712, 711, 1.1,1-trichlorosabans, md 0.6(70.2) shr 9/2, 9/2, 1.2.1-trichlorost dichlorosetham, 1,2-dishlorostham and term-thlorostham, maperitally. A "san hydroxyl radical" concentration of 4-6x10° solut cm ratical concentration of Admile solar hydroxyl radical concentration of Admile solar concentration of Admile solar conf. and a average interhealspheric exchange water of 1.2 years, best fit the observational data. Based on measurements renducted at 19°M during the period of November 1979 to December 1981, mean almospheric growth rates of 25(13)pr/yr; 13 (23)pr/yr; 13(23) and 5(21)pp/yr; are gound for F12, F11, 1.1.1-Tithblorostakus and carbon tetrachloride, respectively. The F12 and F11 measured growth rates are larger than those predicted from emissions data. Oceanic wurface water measurements in the Eastern Pactific show that F12, F11, end F111 concentrations are in rough equilibrium with air concentrations, carbon tetrachloride is afgetficently undernaturated (-351), and thioroschane, itthioroschane sed lavrachlorschene are oversalurated.

J. Goophy, Fem., Gress, Demo. 2018. J. Geoghym. Ben., Green, Paper 201248

1440 Chemistry of the solid earth
188 FOSSIBLE MEANING OF THE CRAMITE OF THE UTE DEEP
188 FOSSIBLE MEANING OF THE CRAMITE OF THE UTE DEEP
189 FOSSIBLE MEANING OF THE CRAMITE OF THE ORIGIN OF
1815:1555PP1 VALLEY OLE DEPOSITS
2. A. Daw (F. S. Caulcigles Lurway, NS 981, Reston,
18 Studyers and H. M. Delaymon.
The first, The Phy. B. Ad Usen mystems of whole-tock
drill-cure mamples of the granite of THE record at
1846 for post-crystallism for sevent. Treatment of
the data on a concard a plot indicate the Yiming of
this disturbance was probably 260 t 19 m.y. and
speciably no older than 400 m.y. and 19 m.y. and
18 for the Section of the Tool post disturbed
rocks plus the Equi polantical Telespire in 1,431 t
18 m.y. These mass are in close agreement with
18 m.y. These mass are in close agreement with
18 m.y. These mass are in close agreement with
18 m.y. These mass is localized for many of the
challows manufan that have a more yet retor, than
plat teles, probably to a factor of 2 to 3 or more

as a result of the disturbance sithough the granito remains lead-rich today (40-30 ppm). In some other studies of disturbed U-D-Ft systems, the reddingents back has been taken up by pecasates foldspars; however, the lead for most samples massus to have been lost from the system for the granice of UFE. One sample with an unusually high lead content of shout 193 p, mass the most radiogenix Pb of any sample but horself "where of Th-D. This sample has obviously gained radiogenic lead by more than a factor of four) and confirms that lasd was indeed mobilised to pures of the systems. Within the limits of the uncertainties, squal amounts of lead were load or gained in both the U-Ph and Th-Th systems, compatible with sobilization being restricted to lead. There is some tendency, however, for the more effected samples to have lower Th-U values and higher U contents. A grapies model in which U in gained, Th legt, and 400p lost preferentially to 207ph and 400p campot be fulled out. U and Th have somewhat different crystallographic locations and decay energies so that 100p happing to the business most of the U coday is located in submicroscopic sites along edges and claveges of blottle and tron oxides so uranium is readily available for resubilization. Lead extraction with only almor U or Th resoval may have been accomplished by chloride-rich brinas. Lead isatope date on the granice of UPS indicates that some of the lead in the ore in the nearby Upper Himismippi Valley lead-size district may have been derived from these granices. An own butter match is made with the orea of acuthesatern Hissourf athrough a greater like that of UPS would only be one and member (neat like that of UPS would only be one and member (neat like that of UPS would only be one and member (neat like that of UPS would only be one and member (neat like that of UPS would end subser) of a mixed source. Curiously, similar aged and heavy mixel rich granitan from southeastern Hissourf are not a good match for the nearby dress.

J. Geophys. Res., Gress, Paper 281876

Geomagnetism and Paleomagnetism

2510 Spatial variations (all harmonics and angualies) GEOMAGNETIC SPUERICAL MARPONIC ANALYSIS: I-TECHNIQUES Dave R. Schmitz (Colorado School of Mines, Golden, Colorado, 80401), Joseph C. Caín Improved techniques for direct least-squares analysis of the main gassayantic field are introduced and test-ed with simulated data, One improvement involves adding secular change data to the least-squares veriation (SV), as observed at fixed magnetic observatories and repeat atations, sirectly adjusts to SV terms of the special harmonic coefficients, while spatial data adjusts both the spatial and SV terms. Simulations shown that SV erors can be reduced by factors of 2 or 3 by introducing SV as data.

The second refinement involved obtaining uncorrelated spherical harmonic coefficients est through employment of a uniform distribution of data by eres or by a compromise of an area-weighting scheme. The latter was shown to reduce high cross-correlations between spharical harmonic coefficients by up to a factor of 3 in simulated tests. This technique is especially useful in analyses of data sets which are unevenly distributed. Justification is given for the area-weighting scheme and also for the employment of evenly distributed data sets, as may readily be obtained in the case of satellife data.

A third refigement, thouch used previously, that of

A third refinement, though used previously, that of incorporating declination data weighted by the horizontal intensity and inclination data weighted by the horizontal intensity and inclination data weighted by total intensity, was shown to have serie on the basis of observed error distributions.

Hydrology

1175 Cinciology
CREMICAL COMPOSITION OF A HIGH ALTITUDE TRASH SMOWFALL
IN THE LADARY MINALYAS
F. A. Myrwaki, W. B. Lyons Earth Sciences and Ocean
Process Analysis Laboratory, Intvestity of New Hampshire, Durham, New Mampshire, (1824) and N. Ahmad
Surface anyou samples from Num Kun in Ladakh, Indian
Himainyas were collected from one amoufall event ac
elevations from \$130 to \$312 meters in July, 1980. The
samples were analysed for destrefum, reactive phosphate,
reactive silicate, reactive iron, chloride, nitrare
phus nitrite ph and amonium. These chemical data
auggest that the snow precipicated during this event
originated from two distinct aft massam, (Himainyas,
Charlochanistry, Manson)

3130 Groundwater
A MUSTRICAL PROCEDURE FOR THE SOLUTION OF THE STRADYSTATE VARIABLE-DESSITY CROUND-MATER FLOW EQUATION
L. K. Ruiper, (U.S. Guological Survey, Mater Resources
Division, Wear Colf Comer Regional Aquifar-System
Analysis, 211 East Jth Street, Ind Floor, Austin,
Team 18701)
A muserical code is developed for the solution of
the obrea-diagnisancia steady-state ground-water flow
equation in which ground-water density varies with
equation in which ground-water density varies with
equation for which ground-water density varies with
equation in which ground-water density varies with
equation in which ground-water density varies
the partial position and is treated has been papitally
dependent persecter. The Integrated Finite
Difference grid elements of the numerical code are
rectangular when visued along the varietal direction,
but their top and bettom surfaces parallel or are
coincident with the interfaces between the geologic
strate within the solution surfaces parallel or are
are sufficient for the securacy of the code are
derived. Approximate solutions for pressure head, as
deterained from the code, are compared for accuracy
with several exact analytic test solutions. (Groundwater flow, variable density, equatical code.)
Mater Sessour, Res., Paper 241625

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JIIO Groundwater

A SEVIEW OF DISTRIBUTED FARRHETER GROUNDWATER

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A SEVIEW OF DISTRIBUTED FARRHETER GROUNDWATER

SAMMINERER MODELING METHODS

3. M. Gorallok (U. S. Gaulogical Servey.

Menilo Park, California, 94023)

Rodels which solve the governing groundwater-flow or

soluta-transport squations in conjunction with optimisalion actioningues, such as linear and quadratic prograzing, are powerful aquifor management tooler

Groundwater handsmannt models fall in two general

categories, hydraulion or policy evaluation and water

callocation. Groundwater hydraulio management models

enable the determination of optimal locations and

proping rates of meserous walls under a variety of

restrictions placed upon local deaddown, hydraulio

gradiants, and water production targets. Groundwater

policy evaluation and allocation models can be used

to study the influence upon regional groundwater use of

functivational policiaes and an texas and quotas.

Purcharmore, fairly complex groundwater-surface water

allocation problems can be bandied using mystas do
composition and multilevel optimisation. Experience

from the few rest-world applications of groundwater

quality management aimed at optimisation. Experience

from the few rest-world applications of groundwater

quality management aimed at optimal water disposel in

the subsurface. This classification is composed of

steady mater and cransient management models that

determine disposel patterns in such a way that water

quality is protested at supply locations. Classes of

research adesing from the literature are groundwater

quality anagement models involving nonlinear con
straints, models which join groundwater hydraulic and

quality groulations with political-sconomic management

considerations, and management models that include

parameter timestrainty.

Mater Ragour. Ras., Paper 241988

3110 Groundwater

**Theory Parketer Strains and Material Camardes Strains and Camardes Strains and Camardes Strains and Camard

3130 Groundwater THREE-DIMENSTONAL STOCHASTIG AMALTSIS OF MACRO-

THERT-DURMSTONAL STOCHASTIC AMALTSIS OF MACRODISPESSIOS IN AQUIFER
Lynn W. Calhar (Parsons Laboratory, Department of Civil Hagineoring, Massachusatts Justitute of Technology, Cambridge, NA 02139), and Carl L. Anness The dispersive Mising resulting from complex flow in three-dimensionally haterogeneous procum media is smalyzed using stochastic continues theory. Stochastic solutions of the perturbed steady flow and colute transport squations are used to construct the macroscopic disparsive flux and avaluate the resulting macrodisparsive; bener in terms of a three-dimensional statistically enlectropic input covariance describing the hydramic conductivity. With a statistically isotropic input covariance, the longiredinal macrodisparsivity is convertively-controlled, but the transverse macrodisparsivity is proporticulat to the local disparsivity and is several orders of
magnitude smaller than the inspicudinal term. With an
arbitrarily oriented anisotropic conductivity covariance, all components of the accordisparsivity tensor are covactively-controlled, and the retio of transverse to longitudinal disparsivity is on the order of
10-1. In this case the off-diagonal components of
the disparsivity tensor are significant, being quasti
cally larger than the diagonal transverse terms, and
the transverse disparsion process can be highly anisotrapic. Disparsivities predicted by the stochastic
theory, which trast the symptotic condition of
large displacements, indicates that a classical gradi
ent transport (Fichiam) relationship is valid for
large-scale displacements.

Water Resour. Res., Paper 2W1698

Sign Groundwater
AQUIFER THERMAL EMBOY STORAGE: A WELL DOUBLET EXPERIMENT
AT INCREASED TEMPERATURES
F. J. Noir (Civil Engineering Department, Auburn University, Alabama 36469), J. G. Noivilla, A. D. Parr, D. A. King
and H. T. Hopf
The two usin objectives of this communication are to
present a study of potential advantages and disadvantages
of the doublet supply-injection well configuration in an
Aquifer Thermal Energy Ecorage (ATES) system and to Vegoria
on equifer Storage problems with nightion temperatures
in the 80 C range. A 3-month hydection-storage-recovery
cycle followed by a 7.3-month cycle constituted the noin
experiment. The injection volumes were 25,402 m² and
16,001 m² at werage temperatures of 38.5°C and 81°C
respectively. For cycles I and II, the fraction of injected energy recovered in a volume of water equal to the
destrimental effects of free thermal convection-posstbly sugmented by longitudinal zones of high permeability,
A third cycle was natzed at the Mobile site on April 7,
1982. This final experiment contains a partially penetrating, dust recovery wall system which is unpected to
manials energy recovery from a thermally strittified
storage aquifer. (Rest, Energy Storage, Droundwater,
Wells).

Water Resour. Res., Paper 2M1679

Water Resour. Res., Paper 201599

3130 Groundwater (Saline intrusion) SIMULATION OF SALT WATER-FRESH WATER INTERFACE J.Ferrer (Sanitary Eng.Dopartment, University of Valencia, Valencia, Epain), F.J. Ramos (Department of physics, University of Valencia, Valencia, Valencia, Valencia, Valencia, Valencia, Valencia, Valencia, Valencia

A mathematical model is prosented which doscribes the salt water-fresh water motion with a sharp interface, assuming the validity of numerical model (finite difference method) unconditionally convergent and stable. A method for solving the equations is selected together with a convergence accelerating procedure. The treatment of the boundary conditions in the interface of the boundary conditions in the interface. ce is discussed, presenting a general and automatic solution for that problem. Several tests with snalyteal solutions have been performend with good results. (Mathematical model, salt wa-

3/60 Mydrology (Runoff and Streamflow)
ASTRPTOTIC DISTRIBUTION OF THE MAXIMUM DEFICIT CORRELATED. PARTIALLY REGULATED CUTTIONS

WITE CORRELATED, PARTIALLY RECULATED CUTTIONS

3. N. Troursman (U.S. Geological Survey, MED, Rex 23046, Paderal Canter, kall Stop 420, Denver, Gelorade, 80225)

The asymptotic distribution of the maxisum accusulated deficit with partially regulated, Markov-dependent net cutflows having a Barnoulli distribution is derived, and the distribution for independent, continuous cutflows is presented it is demonstrated that under partial regulation the maxisum deficit behaves as log a, where n is the langth of the earies; this is to be contrasted with the n's behavior exhibited by fully regulated outflows. Also, as would be expected, the presence of correlation tends to increase magnitude and variability of the saxisma deficit. (Reservoirs, parison deficit, attention, readon walk). Mater Resour. Res., Paper 241660

3175 Soil Moisture
CROP YIELD AS AFFECTED BY SPATIAL VARIATIONS OF SOIL
AND IRRIGATION
A. W. Marrick (Soils, Water and Engineering Department,
The University of Arizona, Tucson, Arizona, 88721) and
W. R. Gardner
Crop yield is calculated for varying uniformities of
seasonal available water. The variation is a consequence of both irrigation and soil hetarogeneity. Analytical expressions and Monte Carlo Simulations are used
to calculate yields for an assumed linear resource functions. A comprehensive table from the Monte Carlo Simulations includes results for 50, 100 and 2003 of the
water necessary for pearlman yield. These are collated
with five uniformities and three levels of effective
available water. Uniformities of satar are expressed
as coefficients of variation ranging from 0 to 2. Variation in either; irrigation or soil affects results, but
irrigation, uniformity is likely more important, supercially for surface systems. The effect of taking the
two distributions — for irrigation and soil — to be
correlated does not affect results greatly, when only
obst of mater is considered, the maryinal rate of refurn is verified to be a maximum; for semiler applications. (Yield response, irrigation uniformity, soil
ye febility, crop, unter requirements).

Micae Remoter: San, Paper 20,720 Mater Resourt : 1844. | Paper 201725

TRUPERATURE DISTRIBUTION AROUND A WELL DURING THERMAL INJECTION AND A MARAPICAL TECHNIQUE FOR EVALUATING ACCUPER THERMAL PROPERTIES

C. S. Cheo (D'Appolonia Community Injector, Inc., 10 Date Road, Pittsburgh, PA 15235), D. L. Roddell Analytical solutions of temperature distribution are causined aguifer with a caprock of finite thickness. Heart transfer by horizontal conduction and convection within the aquifer and by vertical conduction and convection within the aquifer and by vertical conduction and convection within the aquifer and by vertical conduction of temperature distribution around a thermal injection wall are determined. One unsteady state solutions of temperature distribution around a thermal injection wall are determined. One unsteady state solution is for abort time periods and the other is for long time periods. The caprock thickness is only important in the long time period solution. A graphical technique is presented using hypothetical data for evaluating four pertinent aquifer thermal properties: (1) the horizontal thermal conductivity of the aquifer, (2) the thermal capacity of the caprock. And (4) the thermal capacity of the caprock. Pinid measurements of aquifer temperatures near the steady state condition are theoretically needed to utilize the graphical technique. In many practical situations, a longical employing an unsteady temperature distribution is illustrated, and can be used to excluse the horizontal thermal conductivity and aquifer thermal capacity. (Ground water, heat transfer, temperature, ensigning solutions, persenter (dentification)
Mater Resour. Res., Paper 7M1790

Mater Rosour. Res., Paper 7M1750

3199 Nydroicey (General and wiscalianeous)
A NOTE ON FRACTURE FLOW MECHANISMS IN THE UNDOWN
1. Norentake (Department of Chowicel Engineering, Royal
Institute of Technology, \$100 44 Stockhole, Swedon)
Two mechanisms for espreading of a tracer pulse in
fissured media are discussed channeling and diffusion
in the rock matrix. A very idealized case of stretified
flow is treated. A came is modelled where the medium
flows in parallel channels. Each channel is assumed to
consist of the space between two parallel plates. The
flow is isminar. The various channel widths are assumed
to be randowly distributed with a long normal fraquency
distribution. This is a distribution which has been
found experimentally in fissured crystallios rock. For
this case, it is shown that an equivelent dispersion
coefficient will increase with the distance between
injection and observation point. For this case the
mbrash Fickian diffusion dispersion description is not
applicable if the usual assumption is made that the
dispersion coefficient is constant.

There are several interaction work material. The one treate
between a solute and the solid material. The one treate
bear, is the diffusion of the solute into the paroue
rock matrix and sorption of the inner surfaces of the
matrix. This interaction will also lead to the symading of a tracer front, in a similar way to what other
dispersion machanisms do. It is desunstrated that if
the solid material has very long extension, the
dispersion doe to this mechanism is so large that a
Fiction dispersion coefficient can not be evaluated
without explictly accounting for this mechanism.
Attempte to evaluate Fickien dispersion coefficients by
the method of moments will give values which are
antically dependent on the observation accuracy of the

Water Resour. Res., Unpur 2W1751

1710 Boundary Layer Structures and Processes
THE INFLUENCE OF THE ANTARCTIC PENINSULA ON THE WINDFIELD OF THE WESTERN MEDDELL SEA
T. R. Parish (Department of Almospheric Science,
University of Myosing, largesic, Myoning 82071)
The Antarctic Poninsula is a formidable barrier to
the acatorly flow of simble sit over the Weddell Sea.
The domains—up of cold stable air over the Weddell Sea.
The domains—up of cold stable air over the Weddell Sea.
The domains—up of cold stable air over the Veddell Sea.
The domains—up of cold stable air over the position
pountains creates a prossure flate which provides
the necessary dynamic support for strong, sountains
parallel winds often obsurved along the onet side.
Numerical oxportments, using a twn-dimensional (xs)
primitive oqualitys model incorporating a cross-section
of the terrain of the Antarctic Peninnula, are certied
out in attempt to a semilate the priselyla features of
those barrier winds. Implications of the windials
are discounced.
J. Geophyn. Res., Hroum, Paper 201930

J710 Busindary layer exputures and processes DRTERNIHIMU THE FORK PRACTOR TO THE TOTAL STREES BY THE ATMOSPHERIC PLOW OVER RIDGED SEA ICE S. M. Joffre (institute of Marina Research, PB 166, SP-00141 Helsinki 14, Finiand)
Profile measurements from a meteorological mast installed in the middle of a sas ins fine in the Sockelan Bay allowed the skin roughness parameter and drag to be computed. Badlosendened pibal-profiles at the same lucation exception of the large-scale atress and roughness parameter and orations at the generally significant form drag contribution appears to depend also on thermal stability. These results are compared with the predictions from a model of Arys (1975) as a function of sea ion series fastures statistics. The qualitative agreement is good, but uncertainty in the numerical values in considerable. (form drag, surface

values is considerable. (form drag, surface roughnass, ses (ca). J. Geophys. Res., Green, Paper 201925

3716 Chemical composition and chemical interactions THE CORRELATIVE WATURE OF GZONE AND CARBON MONOXIDE IN THE TROPOSPHERE: IMPLICATIONS FOR THE TROPOSPHERE COZONE BUDGET Jack Fishman (MASA Langley Research Center, Nampton, VA 23656) and Wolfgang Seiler (Max Planck Institute for Chemistry, D-6500 Mainz, West Germany)

Germany)
The small-scale vertical variability of tropo-spheric Og and CO is examined from a set of simal-taneous measurements obtained in July and August 1974, between 55° S and 67° N. From this act of vertical profiles, it is noted that many of fluctuations are coincident in both species method is presented that quantifies the correlation between the observed Og and CO veriability. A top-diseasional dejection of the distribution of these correlations shows that there are regions in the troposphere where these trace gases are positively correlated while at the same time, there are regionally considered that the same time, there are tively correlated while at the same time, there are preferred locations where these two species are primarily anticorrelated. The regions of anticorrelated are regions of anticorrelation are consistent with the traditional picture of the tropospheric ozone cycle which suggest that this gas is chemically unreactive in the troposphere. On the other hand, the location and magnitude of the region in which these two species are positively correlated is suggestive that there is considerable in-situ production of tropospheric ozone which is likewise consistant with the more ratent interpretation of the tropospheric ozone which is there is supposited that show that this gas is photochanically active in the troposphere. In addition, the axis tasks of a significant in-situ source of tropospheric of in the Northern Hemispheric is supported by a studeling study which likewise suggests that the observed hemispheric asymmetry in the distribution of tropospheric for in particular of the consistent of t Gaophys, Bis., Great, Paper 201745

3735 Hisetrical Phanomena ALTITUDS, THICKNESS AND CHARGE CONCENTRATION OF CHARGED REGIONS OF FOUR THUMBUSTOWNS DURING TAIP 1981 BASED UPON IN SITU BALLOON ELECTRIC PIELD MEASURIMENTS

Rice betweenty, nounton, texas (721), A. A. Few, and N. E. Maher

Salloon borne carona probes designed to measure vertical electric fields have yielded dats on the vertical slectric structure of four thunderstores studied during the Thunderstore Research interpational Program (TAIP), 1981. All four thunderclouds unhighted a hipolar charge structure with as upper positive charge region and a lover magative charge region. The measure region was consistently centered between the 0° C and -10° C suchtern altitudes. The altitudes of the concentrated positive regions varied considerably. The average vertical extent of the negative regions was 1 km with estimated abunded average charge consentrations regions was of the positive regions was 1.5 km with estimated charge concentrations averaging 5 nC/s² to 1.7 nC/s². Geophys. Fes. Latt., Paper 2L1699

3745 Gravity waves, lides, and compressional waves THE EVOLUTION OF LATITUDINAL SHEAR IN ROSSBY-GRAVITY WAVE, MEAN-FLOW (ATERACTION TIBOLBY J. Durkerton (Physical Dynamics, Inc., P. O. Box 3027, Bellevue, Mashington, 98009)

The effects of latitudinal mean wind shear on the Rossby-gravity wave are investigated. It is shown that this wave stabilizes berotropically unstable mean flow mear the equator. Easterly curvature expands the wave scale and helps to insure the relevance of this theorem. It is also suggested that latitudinal shear, if incorporated into a Molton-Lindzen type experiment, might act to produce a corract saymmetry in shear zone strength in the two phases of the quasi-biennial oscillation. (Rossby-gravity wave)

J. Geophya. Rus., Green, Paper 201918

APEA
H. Bindsberger (Isotope Department, The Welmman
Isstitute of Science, Behovot, Israel and Heteorological
Service, Bet Dagen, Israel), H. Megaritz, T. Cerol
(Isotope Department The Weizmann Institute of Science,
Rebo

Rehovot, Israell, D. Gilad (hydrolgical Service Jerusales, Israel).
The isotopic composition of rainsmier near Mahariya, Israel, was measured in 12 individual storms during the winter months of 1980/1981. Rains most deplated in the heavy styble isotopes and enrichted in tritium are associated with sir meases which come from Morth East Burepe and have a shart, intense interaction with the Best Hediterranean Sea. Storms spoots enriched in ''O and D and deplated in tritium are associated with air meases which come from the Atlantic Ocean and enter the Mediterranean Sea on its western part, travalling along the Morth African Cosas, sometimes with a southerly shift. A relatively high correlation coefficient was found between the stable isotopic content of precipitation and the 800 mb Lamperature. [Air meas trajectories, water isotopis, reins, eastern Hediterranean].

3770 Heteorology(particles and aerosole) LIDAR OBSERVATIONS OF DUST LAYERS TRANSISIENCE IN THE STRATOSPHENE FOLLOWING THE EL CRICHON FOLCANIC ERUPTION.A. D'Altorio, C. Viscontil Istituto 11 Fisica,Università dell'Aquila,67100 L'Aquila,Italy. Intense stratespheric dust layers have been observed with a lider at L'Aquila(42°8,13°8) during the months of July and August 1982. Those features were located at 22-25km with a marinum scattering ratio of 13. In one occasion a layer was slac of served at 32km. Maximum integrated scattering to of the order of 0.001 ar-1. The algast daily fie-quency of the observations has revealed as unisually fant decrease of the altitude of the loyers with an apparent velocity of 0.2-0.3km/day. This pattern is repeated in both the high altitude de layers observed. It is speculated that this effect could be attributed to the tonal distri-

Geophys. Ros. Lett., Paper 21,1795

3770 Particles and Aeromole
A BYCADE OF STRATOSPHERIC SULFATE MEASUREMENTS COMPARED
WITH OSSERVATIONS OF VOLCANIC EXHPTIONS
W. A. Sediscek (Los Alemos Nations) Laboratory,
Los Alemos, New Masico, 87565), E. J. Mrox, A. L.
Larrus, and B. W. Gandrud
Stratospheric sulfate aerosol mensuroments from 19711981 apanning 75°N to 51°S istitude in the sittude
range 13 hm to 20 km are compared to observations of
volcanic scriptions during that decade. C. is concluded
from these data labis 1) meveral unreported volcanic
eruptions or eruptions to sittudes higher than reported
did occur during the decade, 2) the c-fold removal rate
for sulfate aerosol from the stratosphere following
the eruption of Volcan Fuego in 1974 was 11.7 1 1.2
months, 3) the volcanic contribution to the average
stratospheric sulfate concentration over the decade
was greater than 50%, and 4) there may be evidence for
an anchronogenic contribution to atratospheric sulfate
that increases at the rate of 6 to 8% per year.
A complete tabulation of ower 2500 data points is
included. (Stratosphera, acrosal, nulfate, volcano).
3. Seophys. Res., 27co., p. Peper 2C1939

J. Baophys. Res., 2fann, Paper 2C(939)

1790 Instruments and tachniques
RYPECTS OF SOLUTION MASS TRANSPORT ON THE ECC

2COMESONDE SACKAROUMS CURRENT

D. C. Thoraton (Department of Chemistry, Dronel
University, Philadelphia, Panaplysmis (1906), N. Nieny
Vana the electrochemical concentration coll (ECC)
2comesonde subibits a background current at the cime of
helioon launch, the measured cell current must be
corrected to obtain the actual oxono response. We have
convected to obtain the actual oxono response. We have
cound a proseure dependent lator in the background
current that originatus in a convective mass transport
parameter. For atmospheric pressures greater than 100
mb, the mass transport parameter is constant, but at
pressures less than 100 mb it declines logarithmically
with pressure. We suggest that the background current
Correction is directly correlated to the mass transport
parameter pressure dependence.

Compared to a constant beneground ourrent, the
pressure years dependence and content of the consequence of the
ECC oxonesonde data. When the ECC oxonesonde is
prepared so the the ground level background current is
accurated to that the ground level background current.

cut occasioned data. When the ECC commemonds is prepared on that the ground level background current is nonzero but less than 0.1 µA, the correction required for greasures of 100-1000 mb appears to be independent of pressure but may be linearly dependent on time. At greasures less than 100 mb, the hackground current should decrease logarithmically with pressure as both pressure and temperature affect the convective mass transport parameter. With the background current correction based on a seneitivity to oxygen that is now used, the ECC would overestimate total oxnow between 1000 and 10 mb by 0.096 are on for a background current of 0.1 µA at 1000 mb.

Geophys. Res. Latt., Papar 21,1900

Mineralogy, Petrology, and Crystal Chemistry

4250 Hineralogy, petrology and crystal chemistry (mineral occurrences and deposits)
MARGARITASITE! A NEW HMERAL OF HYDROTHERNAL ORIGIN FROM THE PENA BLANCA URANIMA DISTRICT, MEXICO.
Karen d. Wenrich, Peter J. Hodreski, Rohert A.
Zielinski, and James L. Spelay (USBS, Denver, CO 80225)
Hargerisatise, a Cs-rich analogue of carnotite, is a newly discovered uranium mineral that is part of the ore at the Hargaritas deposit in the Pena Blanca trains district near Chihuahua, Mexico. The arapine district near Chihuahua, Mexico. The arapine district near Chihuahua, Mexico. The arapine occurs as disseninated pore fillings and relict phenocryst limings within a rhyodestic tuff braccia of the lower Eucuadra Formation (Oligocene) and provides significant reserves of both uranima and cesium. It is a fine-preimed yellow mineral and is assentially optically indistinguishable from Carnotite. Margaritasite is most easily recognized by Lary diffraction through a shift in the (001): reflection,

reflection, or the mineral give the formula (Cs.1.38 % 0.0 35 % 29 22.02 (002) 1.99 (208) 1.00 110 MgD. Corresponding to the generalized formula (Cs.1.8.0) 2 (002) 2 7.02 inite of where CDX, H₂0 and n=1 that call (1.00 mgD) 2 7.02 inite of where CDX, H₂0 and n=1 that call (1.00 mgD) 2 7.02 inite of where CDX, H₂0 and n=1 that call (1.00 mgD) 2 7.02 inite of the control of) parameters are a = 10.514, b = 6.4251 and C'=

7.252A, 6 = 106.01" (P2./3, Z-2). Microprobe analyzes of carnaricasite and synchesized Ca-enriched carnotices suggest a solid solution between carnotice and margarizasite, but X-ray Dowder Datterns reveal that two diacrets (almansions exist with no intermediate values. The margaritasite has a (001) reflection at 12.79 (20) while that of carnotite lies at 13.69 (20); these paaks do not shift. It is likely that there are two distinct phases, perhaps as fine interlayered langilae. The discovery of Cs-rich carnotite provides important evidence for local hydrochermal or pneumatolitic activity during or after uranium sineralization. Data from the ganchemical literature indicate that the high Cs:total shall element ratios required to produce Cs-rich dinerals can be generated and sustained only in high temperature environments. Synthesis experiments show that margaritasite can form by reaction of Cs-rich solutions with natural carnotite at 2007, but the same reaction does not occur or is too slow to be observed in 61 days at 80%. It appears unlikely that margaritasite occurs in any Colorado Plateau-type uranium deposits. Reported "carnotite" uccurrences from uranium deposits of probable hydrothermal origin are 1980 y sites for new discoveries of margaritasite.

4219 Proparties of Hiperels
IDENTIFYING THE COCRETATION OF SILICON BY MAGIC-ANGLE-SPHANION NAME: STISMOVITE AND QUARTZ
John H. Thomas, John M. Contains-Calbert, Coliu A.
Pyris, Gian C. Gobbi, and Halcolm Nicol (Department of
Chamletry and Biochamistry, University of California,
Los Angelse, California 90024, U.S.A.)
Six-coordinated 31 in atlahovite yields a sharp
2981 MASKOR mignal at -1913-20.2 ppm from THS, wellremoved from the characteristic signal neceinted
With terrahedral coordination in querts, cristobalite,
and other, less crystalline milicoum mollob.
Geophys. Fass.Lett., Fapar 211592

Oceanography

4705 Oteamography (Bunndary Layer and Eschange Processes)
ARCTIC POLYNYA II. STRUCTURE OF TURBULENCE AND SEMSIBLE
HEAT FLUX
S. D. Smith (Badford Institute of Oceanography, Dartmouth, N. B., Camada B2Y 4A2), R. J. Anderson, G. den
Hartog, D. H. Topham, and R. G. Perkin
The Dundam Island Polynys is a natural isboratory for
the Study of atmospheric curbulence and hast eachange
housean the Arctic Ocean and the atmosphere in extreme
(20 to 140c) smaller temperature differences.
A sonic anomomerar-thermomerar unsecured wind and
temperature fluctuations at a height of 4.4 m at the
dougswind adge, where curbulent heat flux uses characterintic of the surface flux from the polynys. Profilms
of wind, temperature, and temperature fluctuations were
also examined. Temperature temperature fluctuations with
passage of convective plumas give skewed temperature
distributions. Semsible heat flux is related to wind
apand and sea-art respectature difference by a stabilitydepondent bulk coefficiant. Formulas describing turbulants structure in convective boundary layers are
verified and compared with published results taken in
less extrems temperature gradients. Using these formules, heat flux, can be actimated from either temperature
verisance or temperature spectre.

I Goobbee Wess. Green. Pages 20185 veriance or temperature spectre. J. Geophys. Res., Green, Paper 201785

4718 Chemical Oceanography
GEOCHEMICAL PROFILES IN THE CENTRAL ARCTIC
OCEAN: THEIR RELATIONSHIP TO PREEZING AND
SHALLOW CIRCULATION.
R.W.Moore (Dept. of Oceanography, Dalhousie
University, Halifax, Nova Scotia, Canada,
B3H 411); M.G.Lowings and P.C.Tam.
Temperature, Ballnity, nutrient, tritium
and oxygen isotope data were collected along
an ice-station drift track extending from 85
48 N 139 58 W to 85 91 97 7 7 W between the
Makarov and Fram Basins in the central Arctic
Ocean. The relationship of these quantities
to the processes that maintain the beloolins,
in particular to the production of eace
saline waters by addition of brines formed
during the ficezing of seawater, is
described. The results support the idea that
the wide continental shelves of the Arctic
Ocean play an important role in maintaining
the falcolino. (Arctic Ocean, geochemics)
profiles, tritium) profiles, tritium)

1. Geophys. Res., Green, Paper 201673 47(3 (Cosan direulation)
UPTARE OF EXCESS CO., BY AN OUTCROP-OIFFUSION MODEL
OF THE OCEAN

WTARE OF EXCESS CO, BY AM OUTCROP-DIFFUSION MODEL.
OF THE OCEAN
U. Sleepethaler, Physics Institute, University of Bern,
CH-3012 Bern, Seitwerland
A derbon cycle model is premented in which direct
vancilation of intermediate and deep owen waters in high
latitudes is taken into account. The 1 1/2-dimensional
comes model is an extension of a box-diffusion model,
including a deep-mea outcrop at the surface. If both are
wallibrated in a consistent way, the outcrop-diffusion
comes takes up more excess CO, then the box-diffusion
comes takes up more excess CO, then the box-diffusion
comes takes up more excess CO, then the box-diffusion
comes takes up more excess CO, then the box-diffusion
comes takes up more excess CO, then the box-diffusion
comes takes up more excess CO, then the box-diffusion
comes to the constitution either of natural or of
box-produced "C. The latter leads to a higher
complete model reaches CO, then the former and to a
better agreement with the observed atmospheric increase.
Long-term model reaches are also discussed. (Carbon
cycle, CO, increase).
J. Geophys. 265., Orean, Paper 201940

Particles and Fields-Interplanetary Space

Silio Cosmic rays
NUMERICAL MODELING OF THE EMERGY SPECTRUM OF THE
COSMIC-RAY FORBUSH DECREASE
A. Mishida (Institute of Space and Astronautical
Science, Komsha, Meguto, Tokyo 153, Japan)
Me have studied the change in the commic-ray density
caused by propagating solar-yind disturbances
(characterized by embancament in valority and decrease
in diffusion coefficient) by solving the modulation
equation formulated by Perker, Classon, and Axford.
The independent variables are radial disturce and
particle energy. The pessage of the region of the equation formulated by Parker, Glasson, and Artord. The independent variables are radial distract and particle energy. The passage of the region of the enhanced solar wind spend leaves behind it hat heating of cosmic-ray particles. The commic-ray density is reduced principally by the sweeping affect of the propagating solar wind distarbance, and the rigidity spectrum of the percentage reduction in dessity or spectrum of the parcestage reduction in density or intensity is roughly proportional to the rigidity dependence of the reciprocal of the diffusion coefficient D. If D is proportional to St. the calculated spectrum is close to P. de which is compatible with the observationally derived spectrum of the Forbush decrease. The density reduction is expected to be preceded by a week preduction of this per coursies (7 > 1 GeV) but by a precursory decrease at lower energies. The letter is the consequence of the particle heating by the solar wind disturbence. (Commic reys, Forbush decrease, interplenatary sheet, wave) isterplanetary shock wave) J. Geophys. Res., Blue, Paper 241870

5310 Cosmic Rays
COSMIC RAY MODULATIONS RELATED TO THE INTERPLANETARY
MAGNETIC FIELD INTENSITY
S. P. Duggal, N. A. Pomerantz (Bartol Research Founda-tion, University of Delawara, Newark, Delawara 19711),
R. K. Schoefer and C. H. Tseo

R. A. Scheefer and C. H. Tsee

Data covering a complete solar cycle (1958-1976) have been analyzed in a comprehensive investigation of the nature of transient modulations of reletivistic galactic cosmic rays associated with interplanetary magnetic field (IMF) intensity excursions in the vicinity of the earth. It had been recognized earlier that the correlation coefficient between the cosmic ray, intensity and the IMF magnitude is seed). In fact, it remains less than d.5 throughout the solar cycle. In order to understand the nature of itself-related codulations, and to minimize the complications arising from the effects of other leature of solar glasms, the data are here analyzed by the method of superposed eyochs. Following seely developed procedures for eyolucting the statistical significance of the results obtained with this type of analysis, it is demonstrated that, while the days characterized by high, IMF magnitude (3) are associated with intensity decreases, the IMF Yarafactions (long) cause an intensity decreases, the IMF Yarafactions (long) cause an intensity will her flux. Maximum consider ray intensity variations associated with both high and lond, occur due day after the key-days characterized by field departures from average

values. This indicates that the modulation machanism becomes afficient only when the plasma engulfment of the earth extends at lesst a gyro-radius beyond I AU. The polar mucheonic intensity shows a prolonged recovery time (7-10 days) following magnetic enhancements as well as representant. These results suggest that, on average, IPF intensity veriations are affective transient modulators of relativistic particles and that the corotation of the modulating region plays a significant role in the recovery of the cosmic ray intensity variations produced by IMF enhancements and rarefactions, respectively, over the rigidity range covered by ground-based nucleonic intensity detectors, (allow a power law of the form IMF—I in both cases. (Cosmic rays, modulation, interplanetary magnetic field).

53/0, 9840 J. Geophys. Ros., Sluu, Paper 241829

5320 Commic ray effects in meteorites RADIATION HISTORY OF LUBAR MICHORRECGIAS AND LITHIC CHONDROLES FROM WESTON METEORITE BY TRACK DATA

L.L.Kathkarov (Vernadsky Institute of Geochemistry and inalytical Chemistry, Academy of Boiences, Noscow 117334, USER). L.I.Genaeva, L.S. Tarasov, G.V. Baryshnikova, A.K.Lavrukhina Tracks generated in the lithic

chondrules of the breadlated Weston H4-7 meteorite and in the lunar microbraccias from the "Lune16" and "Lune24" columns by iron group huclei of solar commic rays were studied. The results for about 2000 olivine and pyroxene grains, contained in 67 lithic chondrules indicate that a relict irrediction of the material occured at an early stage in solar system formation, i.e. before this chondrules were assembled, The results for about 1000 clivine and pyroxene grains in 13 microbreccies suggest the part of chandrules from Weston meteorite containing solar flare irrediated grystals have been formed in processes analogous to the impact formation of microbreccias on the luner regolith without heating of compacted material up to temperature of 600 ~ 70000. (Mateorite, particle tracks, lumar microbreccias).

J. Geoghys. Res., Red, Paper 281507

J. Geophys. Res., Red, Paper 281507

5140 Shock waves

ACCLIRATION OF LOW EMERGY PROTONS AND ALPHA
PARTICLES AT INTERPLANETARY SHOCK WAVES

M. Scholar (Max-Planck-Institut für Physik und
Astrophysik, Institut für extraterestrische
Physik. 8046 Garching, F.R.G.), F.M. Javich,
G. Glocklor and D. Hovestadt

We have investigated low energy protons and
alpha particles in the energy range. 10 keV/
charge to . 150 keV/charge associated with
three different interplanetary shock waves in
the irrediate pre-And postablock region. The
data were obtained with the Max-Planch-Institut/University of Maryland sensot region. The
data were obtained with the Max-Planch-Institut/University of Maryland sensot system on
185k-). In particular, we present special distributions in the pre- and postabook medium as
measured in the spacecraft frame and after
transformation into the solar wind and the
snock frame of reference, respectively, the dependence of the phase space density at differrent energies on distance from the shock and
the form of the distribution function of both
species immediately at the shock. In the preshock, it, it partition are floring in the shock and
the form of the distribution function of both
species immediately at the shock. In the preshock, it, it partition are floring in the shock and
the postshock medium the distribution is
more or loss isocropic in this frame of reference. This is similar to findings at the
earth's bow shock during times when diffuse
earth's bow shock during times when diffuse
earth's bow shock during times when diffuse
earth's bow shock medium the phase space densities fail off exponentially (after subtraction
of a background value) with the same sported
by a power law in energy with the same sported
by a power law in energy with the same sported
by a power law in energy with the same sported
of a beckground value) with distance from the
enothing of the proton and slower intensity increase further apatrence over a time
period of several hours. Although the spectra
of dif

5360 Boler wind interactions with moon and plaumie A PIOMEEP-VOYAGER STUDY OF THE SOLAR VEND INTERACTION WITH SATORN J.A. Slavia (JFL, California, Inst. of Technology, Passdams, CA 91109), E.J. Seith, P.R. Gesis, and J.D. Mibalev Voyager 1/2 observations are used to confirs and magnetopases suggested by the carlier Pioneer 11 genurements. Once corrected for variations in solar wind pressure, the Sararn observations are Sound to Indicate a magnetopheric radius in the terminator plane equal to 1.8 times the nows distance. This ratio is 30% greater than the terrestrial value and pane agast a 110 creater than the retreaterial value and is cotroborated by the very blunt shape of the Satura bow shock and large width of the farward magnetopheath. Possible causes and resification of these results for the solar wild interaction with Satura ere discussed. Geophys. Mes. Lett., Paper 2L1800

Particles and Fields-Ionosphere

S510 Auroral sons sagnatic affacts
COMPAIRON OF PRASE AND ANDICTION STRUCTURES OF Pad PULSATION OF PRASE AND ANDICTION STRUCTURES OF Pad PULSATION IN THE MORRING AND APERSONS SECTIONS O. Sake, J.S. Kim. (Department of Atmospheric Science, State University of New York at Albamy, Albamy, New York 1222) and M. Sugiura
Spatial chara and amplitude atrustuces of the morning and afternoom Poly subscitions are nonpared using the North Adexican BIG Hagmathmater Network date. Comparisons of phases and amplitudes between different stations were made by a tross spatial analysis. The magnetic local time (ULT) of the avents analysed extends from 5000 to 1100 for the morning and from 1200 po.2100 for the afternoom. All events were observed ather during quiet periods or deving this recovery phases of substances. The following resolts are obtained: (a) The spatial phase structures are very similar in the morning and afternoom seators for each of the three composents. (b) The amplitudes are the magnetic morth and east composents, respectively. (c) The letitudinal variations of the amplitudes and of the phase differences between 1 and 1 show dissingliarities in the afternoom selected field confilations in the afternoon selected (confilations in the afternoon aspector). As pean from the ground deservations, the pelasticon of the amplitude and the supposed field confilations in the afternoon aspectosphere, are apt chestward on the ground in this time sector. As pean from the ground observations, the pelasticon of the ampliations in factors.

spheric field in the transverse mode. The theory of the resonant oscillation of the memotic field lines, which successfully explains the pulsations in the coming sector, does not seem to be applicable to the pulsations in the afternoon sector. (Pcl pulsations). J. Geophys. Res., Blue, Paper 241872

5515 Auroras
MIJa66ā] ARD NI(5200A) EMIBSIONS FROM VARIOUS NICHTARD DAY-TIME AURORAS
G. G. Sivjes (Geophysical Institute, University of
Alaska, Fairbanks Alaska 99701), R. A. Marshall
MI[2p3 2p + 4s, 3466Å) and MI[2p3, 2p + 4s, - 5200Å] Alaska, Fairbanks Alaska 99701), R. A. Marshall
HI[17] P. *8, *33.866) and HI[27] P. *8, *5200A]
multiplat rad/attons were monitored gimutraneously
from various uight and day-time acrosses using two
large through-put co-minaed spectrophotometers.
Measurements were made around wister cointice periods
at tonyanthyan (t. = 15 %), Srathard, where large ()
20°) solar depression angles, even during local uid-day,
permitted continuous round-the-clock observations.
Average energy of particles precipitating in surcrus
sighted over tongrarbyen ranged from a few key uc
night to less than a hundred eV in the mid-day cusp
section of the averal ovel; the corresponding stmospheric heights of peak annoral-energy deposition
varied from around 110 km, where molecular species are
the major constituents of the atmosphers, to above 200
km, where atomic species are more dominant. Because
of the difference in redictive lifetices of HI [27]
and [28] states, as well as difference in atmospheric
extinction around 3466A and 3200A; the intensity
ratio t[3200A] / 11366A | veried in dynamic surcrus
associated with large changes in surcral energy flux,
and with the extent of cloude or hase in the sky.
Using only measurements from clear sky during steady
autorias, we find that in all autores the average value
of the intensity ratio 1[5200A]/1[346A] = 1.8 1 0.4.
(etomic calestons, nitrogen, surcra).

J. Geophys. Res., Blue, Paper 2A1974

5545 Lonospheric disturbances A THEORETICAL STODY OF THE HIGH LAYITUDE F-REGION'S RESPONSE TO MAGNETOSPHERIC STORM INFUTS J. J. Bojka. (Canter for Almospheric and Space Belances, Utah Siete University, Logan, Utah 84182) and R. W. Schum.

I. A. Bojka. (Canter for Atmospheric and Space Sciences, Wesh State University, Logan, Utah State) university, Logan, Utah State) university, Logan, Utah State) and R. W. Schuh.

The response of the ionesphers to magnetospheric atom inputs was modelled. During the storm the two major produces which couple the Fernation to the magnetosphere, manely the electric field distribution and the particle precipitation from the magnetosphere, undergo dreatic modification on relatively short Fregion itseements and the particle precipitation from the magnetosphere, undergo dreatic modification on relatively short Fregion itseements at the company of the second of the second of the second of the storm second the dependent changes. The lower Fregion responds on a closecial of only minutes to the storm secolated changes in the auroral precipitating electron flux, awing to the downiance of charlatry procurion-less mechanisms over transport processon. At higher altitudes in the victuity of h.p. the checistry is beleated by both please diffusion along field lifes and horizontal plants convection, which acts to prolong the effect of the storm for many hours after it has caused. The past density responds only alouly to increased precipitation and may not reach its Eastern enhanced value until over an hoar store the storm man precipitation thas passed. Mosever, the Fregion past can be drautically altered on a tipe scale of minutes if large varietic transport velocities are associated with the storphology of the storm secondary in the storm district field pattern. Time delays of up to let former securate high stitutues for "post" densitive to be reached after a storm, and the subsequent recovers is on the order of 5 hours. These long televan at altitudes and the order of the storm electric field pattern. Time delays of up to let constants, associated with places diffusion from low altitudes, where the order of 5 hours. These long delays at altitudes, where the places is created, to high situades.

5509 General (Spacecraft Glow) CONJECTURES OF THE ORIGIN OF THE SUPFACE GLOW OF SPACE VEHICLES

CONSISTEES OF THE ORIGIN OF THE SUPPACE CLOS OF SPACE VERICUES.

TOO G. Slanger (Holecular Physics Laboratory, SRI interactional, Hanlo Park, CA 94025)

It is argued that a plausible identification of the autfaca-originating glow that has been observed on the AF-E satellite and the spacen shattle between 140 and 400 hm is the OM Mainel hand evator. The original of and 400 hm is the OM Mainel hand evator. The original with 5 eV 0, TP access at high altitude, and with 10 eV 0, molecular below 160 km. The primary factors that favorable identification are the apparent spectral Mistribution and the deduced radiative lifetime, and if valid, implies that the total equivalent surface brightness of the vehicles is on the order of 10 MR, mainly in the mear infrared. (Space shuttle, surface reactions, OR Molum) bendel.

Geophys. Res. Lott., Papar 21,1886

Particles and Fields— Magnetosphere

5705 Bow shock waves
10N6 UPSTREAM OF THE EARTH'S BOW SHOCK: A
THEORETICAL COMPARISON OF ALTERNATIVE SOURCE
POPULATIONS
S. J. Schwarte, N. F. Thomson (MS D416, Los
Alamos Mational Laboratory, Los Alamos, NSt
87345), and J. T. Gosling
A theoretical framework is developed for
studying trajectories of loss reflected or leaked A theoretical framework is developed for studying trajectories of icon reflected or lasked opercess from the earth's bow wheek and subject solely to the Lorentz force in a steady interplanetary magnetic field hand the Y = 3 electric field. We include the effects of a that p thock potential view. Expressions etc derived for the guiding cents motion and gyromotion in a frame (the Noffman-Tellar frame) moving purallel to the shock surface with sufficient speak to transform the incident solar wind velocity into motion entirely along the enterplanetary magnetic field; the appropriate equations are also provided to transform these motions back to the observer's frame. The utility of these expressions in tilustrated by comparing the predicted upstream solions for four different source models for upstream iones magnetic moment-conserving reflection of solar wind ions, aspectin moment-conserving lephage of magnetoshacht ione, and laskage of magnetoshach ione, and laskage of magnetoshach to the chock notwal. This comparison reveals that, for identical these models helped ions parallel to the shock normal. This comparison reveals that, for identical geometries, the reflection models produce higher margine and/or gyrenotion than do the leshage models. We further argue that in a single single encounter with the shock, an ion should heave in an anasymetical wamper and hence should not magnetic moment. Comparation of magnetic moment, if it is to occur, would seem to require multiple encounters with the shock. We investigate the conditions under which such multiple encounters can occur and find that under most quari-parallel geometries mainter leaked sor reflected jons should probably conserve that magnetic momente. (Bow shock, upstream leve).

J. Caophys Res., Blue, Paper 241873

8705 BON Shock Mayes THE OBLIQUE WHISTLER INSTABILITY IN THE EARTH'S FORE-

J. Gapphya. Res., Blue, Paper 241673

THE OBLIQUE WHISTLER INSTABILITY IN THE EARTH'S FORE-SHOCK

D. D. Sentman (16PP, University of California, Los Angeles, CA 98024), N. F. Thomsen, S. P. Bery, W. C. Feldman and M. M. Hoppe

The linear viaxov stability properties of electron velocity distributions temilar to those observed in the upstream foreshock region in Association with obliquely propegating whistler waves at approximately it are studied. These distributions are modeled by a sum of bleakwellians with drift speeds parallel to the magnetic field, B. Ne find such distributions to be stable to modes with wavevectors t parallel to 9, but unstable to whistler waves propagating obliquely to the magnetic field. The frequencies and wavelengths of these unstable modes agree well with those of whistlers observed upstream of the earth's bow shock. The free energy source driving the lastability is a region of positive parallel slope of Agrays O at large pitch angles (about 85) and intermediate energies, (about 20 ay), probably corresponding to solar wied electrons magnetostatically reflected true the meanatic resp. of the Box: Shock. The whistlers grow via electronegnetic Landau resonance with this free energy.

Source. 1. Geophys. Res., Blue, Fapar 281934

5715 Electric Fields SOLITARY WAYES AND DOUBLY LAYERS D4 AUROTAL FIRLD LIRES Links M. X. Sudson (Space Sciences Leboratory, University of California, Berkelay, CA 94720), W. Letko,

A California, Berkeley, CA 947203, W. Locke,
1. Ruth and E. Witt
Tima-stationary splutions to the Vissey-Poisson
squation for ion holes and double lawers are
standard along with particle simulations which
parties to recent observations of small sepiteds
a 977-v. I observe field structures on auroyal
field lines. Both the tima-stationary analysis
and the simulations seagest that the observed
double layers woulde from holes to ion phase space.
Naitiple small amplitude double layers, as seen in
long simulation systems, are observed to propagate long simulation systems, arm observed to propagate past the spacecraft and may account for the accel-tion of plasma shoet electrons to produce inverte-

3. Georbys. Ros., Stus, Paper 2A1760

5720 (loteractions between solar wind and magnetosphere)
PLASHA REST FRAME FAROMENCIES AND POLARIZATIONS OF THE
LOW FROQUENCY MESTREAM MAYES: ESPE-1 AND -2 DESERVATIONS
N. H. RODRE (Inpattute of Goophysics and Planatary
Physics, University of California, Los Angelos, CA,

M. M. Mophe (Institute of Geophysics and Planstofy Physics, University of Caiffornia, Los Angelos, CA, 9002a), and G. T. Swesell

Using regnetic field dera from the dual Ideal and 2 specarefor an lave determined the plansa reast fraca fragametes and polarizations of the large smplitude low frequency (0.03 Hz) upsteem whose. The none-checastic situated waves associated with "interceddate" ion fluore are associated with "intermediate" journal of the wave associated with "intermediate" yeurgements "A. f., and wave lengths "I R.. The chilquely propagating "shockine" form of the waves is also predecimently in the nagmetosonic code, but occasionally also appears in the Alfvos seds with similar rest frame frequency and wavelength. The generation of the regnetosonic code has been orplaned by the well established cyclotron resumance machanism driven by macrow reliected ion boars but the concurrant observation of Alives node wave spreams to require wave generation by the core isotropic diffuse ion distributions as well. (Upstream waves).

J. Geophys. Ros., Blue, Paper 241831

5720 Interactions betwee soler wind and magnetosphere Soles Wind Content of the Low-Latting Asymmetric MACKETIC DISTUPBANCE FIELD C. R. Clauer (Relications Laboratory, Stanford Polywoodly, Stanford, CA 94105), F. L. McFherron and C. Searla

C. Searls

The eachnique of empirical linear prediction filters
to ward to inventigate the extent to which the low
initiated sawmedus languartic asymmetry to controlled by
the dead-duck color who extend the extent to thick
the dead-duck color who extend thereit field Wa
and/or by substorm processes measured by the westvard
averal riserrojet index AL. The deam-duck asymmetry
is resoured by a new index defined as the difference
between dawn and death deviations in the X (geomagnatic
foutthwird) magnetic field component. The empirically
determined filters obtained from this analysis provide
quantitative information which characterises the coupling processes. For mample, the Way to AL filter is
a delayed suite beginning etter a delay of 13 whose,
peaking at 60 minutes and returning to same at 120 minuter. The filter has the characteristic of a low pass
filter with a cutoff frequency at 10th list. The Way to
ASTH filter is also a dolayed pulse with similar conments. The Way to ASTH filter, however, when hea a
long tall which gradually decays reaching word mear
5 of 6 fours log 1 low. The AL to ASTH filter is
actual, being nonisso at future log those. The pash
of the filter occurs at a delay of about 10 minutes
and decays reponentially breaking mearly aero after
4 hours log. Our results indicate that some currents
are discretive driven by the solar wholecompany at the solar places. are directly driven by the abler wind-connection and that their magnetic perturbations contribute to both the Al and ASTA indices. A portion of the At Judex which is uncorrelated with VB, is, however correlated with ASYM auggesting that internal magnetospharic processes contribute to AL and ASM as well.

57:0 Interactions Setween Solar Wind and Magnetosphere
JOY147 MODULATION OF INTERPLANETARY ELECTRONS AS
09:EMPLD WITH VOYACERS I AND 2
A. M. Schirdt (Mass/Goddard Space Flight Center,
Greenbelt, MD. 20719). F. G. McConald, J. H. Tealor
The release of magnetospheric electrons from Jupiter
into laterplemetary space is modulated by the Jovian
rotation period. The Yogager i and 2 observations
stowed that the modulation period agrees on the
average with the symodic period by several minutes.
19h 55m 3J.12s), but over intervals of weeks it can
differ from the symodic period by several minutes.
The lack of easet symbronization is attributed to
changes of the playma population in the Jovian rugnetosphere. The Joyian modulation appears to be a
persistent feature of the interaction between the solar
wind and the magnetosphere and the dissipance of
the modulation away from Jupiter is attributed to
interplanetery propagation conditions. Modulation
was still detectable at 3.8 A.M. behind Jupiter in
the for magnetotall. This requires a rean free path Was still detactable at J.B.A.W. beams support in the far majnetotall. This requires a rean free path in the tail 2 0.75 Å.U. and good field connection along the tail to Jupiter. (Interplanetary electrons, interplanetary propagations, Jovian magnetosphere, rodulation). 1. Secture. Res., Sium, Espac ZA1904

3.16 Regnetic cail
THERAL AND SUPARTHEMAL PROTONS AND AIRMA PARTICLE
IN THE EARTH'S PLASMA SHEET
F. M. Igazich (Department of Physics sof Ameronous,
University of Marylood, College Park, Haryland, 20742)
and M. Scholer
We have investigated thormal and auptathemal protons
(fire -15 km/ to -1 km/) and alpha particles (iten -15
km/V) to 130 beW/Q) in the quasi-public plasma sheet
over inped midnight at genomerable distances of -12-20
aarth raisi. The data, obtained during five different
plasma shoet pomerations with the Marylandes of the plasma sheet
interesting the Maryland account ayasta on 1822 1,
represent the first reasurerchie of plasma sheet in
composition in this energy range. Molec -16 keV the
proton agentee can be represented by a Maryland and
distribution. About -16 keV was find a separatemal rail
which cannot be represented by a single power law in
acre cause the supatiburial population commisses of the
Jistic: components a low energy concount failing off
shirply at -100 km/ and a high energy component ratending up to -1 May. The high energy component setseding up to -1 May. The high energy component setseding up to -1 May. The high energy component setseding up to -1 May. The high country component setseding up to -1 May. The high country component setseding up to -1 May. The high country component setsedthings or quality and particles are charge or events energy per
charge or events energy per partials.

J. Energence Sens. None Forma 21443. J. Couplys, Sca., Blue, Paper 241644

5735 Hagnette Tail CH RECONNECTION AND PLANNOLOG IN THE GLONAGUETIC TAIL IN SECONSECTION AND PLANMOIDS IN THE GOMMUNETIC TAIL T. G. Forbes and E R. Priest (Orpt. of Applied Mathematics, The University, St. Andrews, Scotland, TVIO 983) The nonlinear geolution of the collisional tearing the nonlinear geolution of the collisional tearing

The nonlinear grolution of the collisional tearing mode is conservally determined for a two-dimensional current sheet configuration shore angestic field lines are tied at one end to a stationary surface. The configuration is analogous to that occurring as the gromagnetic tail at the start of a substorm. The numerical results suggest that the formation of a near-least neutral line at substorm ones is due to the asymmetric tearing that occurs because the field lines in the geomognetic tail are partly lise-tied, or anchored, by the parth's ionotyphera, the results also suggest that during substorm recovery the neutral line in the tail stopes any from the Earth at a speed on the order of the speed of the plasma flowing into the cutor of the speed of the plasma flowing into the constraint with proposel reconnection models of the substorm. Not suggests that the recovery phase say be more complex than previously expected, due to the grouth and consenses of multiple magnetic laiseds (i.e. plasmoids). (Reconnection, tearing instability, substorms).

i. Gesphya. Bes., Blue, Paper Zalbio

978; Anjakis; heric configuration
7019, Anjakis; heric configuration
7019, Anjakis; Elding (1925. up Physica and Advicatory)
For first and the second of the

can extend to arbitrarily large radii. With meak additional assumptions, it is shown that $H_h \cdot I_d$ for a mainly coloidal field and $H_h \cdot 1$ for a sainly togoidal field. For the Jovian magnetodisk, $H_h \cdot 0.8$ from Voyager I inhound data, and the observation of a toprorature meanly constant of allowing descriptions of the color of the col there. (Magnetohydrodynanics, coreta Mach number, tenyerature) J. Geophys. Ros., Blue, Paper 2A1558

373) Plasma instabilities
TERPESTRIAL CONTINUUM PADIATION OBSERVATIONS
WITH GEOS-1 AND ISEE-1
J. Excholo (Centre de Pecherches en Physique de l'Environnement Terrestre et Pianétaire, CNET. 92131
1839-1es-Moulineaux, France), P.J. Christiansen, M.P. Gough,
and J.G. Trotignon
Examples of results from a dual satellite (GEOS-1 and
18EE-1) study of infrestrial non-thermal electromagnatic continuum raduation are presented. The problems of sources and
generation mechanisma are discussed in the context of simultaneous measurements of radiation arrival directions, radiation
cut-offs, and detailed spectral observations. The results, which
imply significant contributions from the magnetospheric volume
to the low frequency furspeeff component, conflire the
near-plasmapause as the source of the higher frequency
("escaping") component. The detection of significant X mode
radiation and the implied presence of localized non-directive
sources field us to conclude that turrent theories of generation
are inadequate. (Continuum, waves, coupling, directivity).

Geophys. Res. Latt., Paper ZL1630

3755 Plesma instabilitios

KELVIS-BELTGOLTZ INSTABILITY AT THE HAGNETOPAUSE: EMERGY
FILK INTO THE HAGNETOPHERE
ZU-yin Tu and M. S. Elvalson (Dopt of Earth & Space Sciances and institute of Goophysics & Plenstary Physics,
University of Galifornia, Les Angeles, CA 90024)

A magnetohydrodynadre approach is used to investigate
how compressional linearly unstable Esivin-Holmholts surface waves on the magnetophorite sate, the energy from the
boundary. On the magnetophorite side, the energy from the
boundary. On the magnetophorite side, the energy from the
face waves on the Alfvén space. The snargy flux, for
typical rouditions on the dayside magnetopause, is found
to be 10¹³ args/sm s and the total energy flux ovar the
unstable region on the dayside magnetopause in detirated
to be 10¹⁴ args/sm magnetic quiet line, or 10¹⁵ orgs/s
in disturbed times. The decument of some property
that the sagmetophore allacted how surface waves on the
magnetosphere illustrates how surface waves on the
magnetosphere illustrates how surface waves on the
mayor against provide the power on drive remonant regions
within the magnetosphere at large distances from the
boundary. (Kalvin-Holmholtz Instability, magnetopause
waves, radecospheric energy flux).

J. Geophys. Ras., Blue, Paper ZA1666

J. Geophys. Ras., Blue, Paper ZA1666

J. Geophys. Ram., Blue, Paper 241984

5755 Plasma Inscabilities
EXPERIMENTAL EVIDENCE FOR THE ACCELERATION OF THERMAL
ELECTROSS BY TON CYCLOTRON WAVES IN THE NACHETOSPHERE
A. J. MORTIS (Hulled Space Science Laboratory, University College London, Molmbury St. Mary, Dorking,
Surrey, U.K.,), J. F. E. Johnson, J. J. Sijks and G. L.
Wrenn, N. Cornilleau-Wahrlin (Contro de Racharches on
Physique de l'Enviconament Centra, Nacional d'Etudos
des Talecommunications, 9211 Issu-les-Moulinasux,
Prance), S. Perceut and A. Roux
Ion cyclotron waves (ICM9) ac frequencies just above
fg. t, she helium Syrofrequency, are often observed by
the ESA secalities UBOS 1 and UBOS 2. Young at al.
(1981) have abown the close Connaction between these
ICMs and the presence of thermal He lone in the outer
magnetosphere. The purpose of this paper is to provide
axparisantal evidence for the acceleration of thermal
electrons by the large sumilitude ICMs. The wave power
in the ultra low frequency (ULF) range near fg. is compared with the distribution function of low safety
electrons, measured by inscruments shread the GEOS
satellites. It abous that, tear the gammagnatic equatur, electrons are accelerated along field lines at
times when the ICM energy is large and the cold plasma
density is below a threshold value. It is suggested
that these accelerated electrons can account for the
ELF emissions, modulated at the ICMs frequency, observed by Cornilleau-Wahrilu (1981). Other ULF events having frequencies close to the proton syrofrequency (paare also observed and result in a very efficient accelevation of thermal electrons and account for the
ELF emissions, modulated at the ICMs frequency observed by Cornilleau-Wahrilu (1981). Other ULF events having frequencies close to the proton syrofrequency f, bare also observed and result in a very efficient accelevation of thermal electrons and account for the
EUS emissions. The
evidence in this case is their medius onergy protons
having large compenzature malactropies (fg. > Ty) In
the 10

waves, regentosphoric energy flux).

J. Goophys. Res., Blue, Paper Zaló66

3755 Plasma instabilitios
REIVIN-HELHROLTZ INSTABILITY AT THE MACHETOFAUSE:
SOUTTION FOR COMPRESSIBLE PLASMAS
Zu-jin Pu and M. G. Kiwelson (Dupl of Earth & Space
Sciences, and Inst. of Goophysics & Planetery Physics,
Univ. of Celifornia, Los Angelac, C. 40024)
The Reivin-Beitholtz (K-B) instability of a temperatel
discontinuity in a compressible plasmas to roceanined in
the linear magnetohydrodynamic (PHD) approximacion. For
fixed plasma conditions, two different inde of surface
waves (labelled F = [ast and S = slow) may swint simitempously with different targental wave vectors, i.
The auxiera waves can be excited only for a lithied
cange of U, the rolative flow spend of the plagues on
the two sides of the interface. Thus, the inerability
requires U_{Ca} * U 'U_{Ca} where V_{Ca} and V_{Ua} are the lower
and upper critical velocities, respectively, and the
substript, n., distinguishes the fast and alow surface
waves, with U_{Ga} * U_G. In the incorpressible libit,
there is only one surface wave with lower critical
velocity, U_{G1}, and no upper critical velocity. It has
frequently beam remarked that compressiblity reduces
the lower critical velocity. We show that the offect
is scall for the F-wave but that U_G is considerably
maxiler thum either U_G or U_{G1}. However, for a given
h, the S-wave is unstable only for a very small respo of U. Growth tattes, c_{G1} of the surface waves are calculated and cy succeeds slightly the growth rate for the
incorpressible plasma.
In particular, for the nontral completions of the dayside
equatorial regenetopause, S-sode waves do not occur mar
the stairwas U_{G3} (i.e. with E_f perpendicular to the magnarcephatic negacitymes, S-sode waves do not occur near
the stairwas compressibility is relatively ineffective in reducing the significance of the upper critical velocity. In this limit, the phase valocity of
the fast surface wave appraches she NG fast mode space
into the bounding plasmas. Considerati 5755 Plasma lineabilities

HIGE & THEORY OF LOW PREQUENCY MACHETIC PULSATIONS

E. Higiluolo (Righ Altitude Observatory, Nacional Center
for Algosphoric Research, Boulder, Colorado 80307)

The theory of low frequency (compared to ics cyclotron), long wavelongth (ion Larvor radius < wavelongth
< equilibrium meals langth), arbitrary - 6 modes to devoloped. The following model equilibrium is used to
represent the magnetospheric plasma near the geomagnetic
equators a two component (but and cold) inhomogeneous
hydrogen plasma, and a scraight inhomogeneous magnetic
flaid. The stability properties of three modes are presented in derail: the drift-compressional mode (driveu
by VP), the fire-hose mode (driven by Tg > Tg), and
the drift-miror mode (driven by Tg > Tg). Theshold
conditions for instability of sech mode are also examined, Comparisons to serious models and to one observed
event are also presented.

J. Geophys. Res., Blue, Paper 241911

5755 Please Instabilities
THE INFORTANCE OF VE DRIFT IN HIGH & HACKETOSPHERIC
PLASMA INTRABILITIES
P.H. Eg and V. L. Pacal (Department of Physics,
Chiversity of Denver, Denver, Colorado, 80208)
The coupling of the shear Alfven wave and the drift
compressional wave in studied in a two-component
please. It is shown that with the incorporation of VB
paticle drift in the dispersion equation the cold
component in addition to reducing the Alfven speed to
create an unstable drift compressional wave, size
plays of important sole in the coupling of the odds to
the abser Alfven wave resulting in major modification
of the instability. (Gradient B drift, coupling).
Geophys. Res. Lett., Paper 2(1901)

of the instability. (Gradient B drift, toupling) Geophys. Res. Lett., Fepr Z11901

5753 Finema Instabilitian
EUD3-451PLE STATION VIT WAVE-PARTICLE UNTERACTION EUPRIPHENTS 2. TRANSHITTER SIGNALS AND ASSOCIATE HUTSTERS TRANSFORM THE SIGNALS AND ASSOCIATE HUTSTERS (California 2405), U. S. hum, I. Kimure, R. Meramoto, T. Rakai, and K. Hashimato
Interactions between coherent VIF waven and enargatic particles in the magnetosphere have been studied in a joint program involving the Jepanese high-sittude satellite EUD3-8 and the Jepanese high-sittude satellite EUD3-8 and the Jepanese high-sittude satellite EUD3-8 and the Jepanese high-sittude satellites EUD3-8 and the Jepanese high-sittude satellites burs corridout on 50 separts occurations when the spacecraft was within 1607 longitude of the magnetic field lines linking Siple Station, Astarctic (78°S, 24°M, Recgraphic, L-4.1), with its conjugate station at Roberval, Canada, of this total, 37 were carried out while in the 0300-0800 LT sector. The transatter signals were observed to have triggered VIE walksions unswehter signals when translations were attempted, and on 3 occasions the transatter signals were observed to have triggered VIE walksions unswehter along their ray park between the innosphers and the satellite. All 5 triggering wants occorred in a 6-day vectol Colloving large segmants strong that took place on August 13, 1979, with 2 weente occurring in the 1150-1301 tr sector and 3 constitutes the third occuration that the Viggering the provided actions variance that the three provides actions and that the unispine strong wavidance that the three provides actions reached the establitate only after being scattered at one and of the ducts by innocepher is include visities. On at least one day, shallows were triggered by ducted aches of the transatter of spate has took that the three cold dive in examinator of spatetred was observed. We conclu

J. Gaophyo. Rome, Slug, Paper 241577

3755 Flamma Inscabilities Electrostatic Structuration Stru

J. Geophys. Res., Blue, Paper 2A19Ji

3760 Plasma Motion, Convection or Circulation
MASS COCPOSITION OF SUBSTORN-RELATED ENERGETIC ION
DISPERSION EVENTS
R. J. Strangeway (Lockhaed Palo Alto Rasearch
Laboracory, 3251 Hanover Street, Palo Alto, CA
93001, R. G. Johnson
The lockheed ion Mass spectrometer flown on board
the SCATBA (778-2) spacecraft is used to study the
mass composition of two ion dispersion events. The
energy-dispersed ions are observed over the full
energy range of the instrument (O.1-32 keV/q) in the
moon-durk local time sector. On one of the days, 22
March (day 81) 1979, the dispersing ions are first
observed following an isolated substorn. A long pariod
of low magnatic activity is present prior to the substorn on this day, and a dactense is D_m is observed
following the first observation of the dispersing
lous. On the second day studied, 7 June (day 198),
1975, the cortelation between ground segment, activity
and initial observation of dispersing ions is not so
class since the dispersion follows a pariod of high
magnatic activity. Both dispersing ions is not so
clar since the dispersion of ollows a pariod of high
magnatic activity. Both dispersing anarymosymchronous plasma near the noon escoor. The mass
composition shows that sixhough there are similarities
in the dispersion for both protons and caygon, there
are also distinct differences. Both specials show a
definite dispersion ridge, but the protons also have
additional (luwes at energies greater than the dispersion ridge energy. It is proposed that the composition changes are actributed to localized injection of
lonospheric plasma in the dusk-midnight eactor, with
proton rich plasma has it dus convecting page the
appearance of the dispersing loss. Frotons at 10
pitch aughes arrive at the apsecuration before oxygon
loss at the same pitch angle. (Ton composition, ion
dispersion)
J. Geophys. Res., Blue, Paper 2A1856

disparsion) J. Geophys. Res., Blue, Paper 241856

5780 Please motion, convection, or diroulation THE ORIGINS OF BURKLIND CURRENTS D. P. Stern (Pleasetty Hagnetospheres Branch, Goddard Space Flight Cepter, Greenbelt, Maryland

2071)
A qualitative explanation is proposed for the main features of quiet-time Birkeland ourrents. The major conclusions are: (1) The source of region 1 ourrents is the interplanatary electric field, linked to the polar ionosphere directly along open field lines near moon but indirectly, via the plasma sheet, at most other longitudes. (2) Begion 2 arises from convective charge separation, owing to guiding center drifts. On the day aide, accordance observe separation as the day side, accordary charge separation may coour, extending the current pattern numbered. (1) The magnetopause boundary layer flow is not a major energy source of j., and peith dynamo processes in convected places or in the places sheet. (4) The convection reversal is planus sheet. (1) The convector ylerans or in the planus sheet. (2) The convector reversal is especied to coour (as observed) in the interior of region i, often sear its polesynd edge. (5) The cusp currents are associated with an intensemble of the planus of the planus of the planus of the deserved by the pener, though contributions by the boundary layer, are not rilled out. (5) The Alched polar sleeting field petterns coonsionally chapters are generated by a boundary layer dynamo and algority that temporary anistence of a closed asgestage to configuration. (7) The branching ratio between two routes by which sumstoopheric space there may be neutralized, via the long-space there and via polarisation currents, is estimated, with and without considerations.

3760 Planue Hotion, Convection, or Circulation
CHARACTERLICITOR OF GROWNTHOMAX PANTON
REPRESENTED HOTEL TATEOTICS, SOUTHOR HODEL
18 To Many (Applied Physics Lab., Johns Repkins
University, Labrel, No. 20707) and C. T. Mang

To lond further support to the "injection boundary" concept, this paper characterizes the details of genetalizative particle signatures by using a very simple-mindual analysis procedure. The signatures are generated using the time-of-flight offects which order from an initial sharply defined, double-spiraled boundary configuration. Using anly the mat fundamental features of standard convection configurations, the very complex and highly variable dispersion patterns frequently observed by genetationary entailities are successfully reproduced. In particular, sweep distinctly different concludering faired dispersion patterns on energy we time spectrograms it w to low Ref) are predicted, and all sowen of those are observed on a regular basis by both the SCARA satellite (in the near genetationary orbit) and the ATS-b actellite. Hamy of the details of the patterns have not been previously reproduced, it is concluded that most dynastical dispersion desires (including onergetic ion and electron echae) can be supped to the double-spiral boundary without further ad-ham assumptions. It is shown further that the predicted and abserved dispersion patterns have symmetries which are distinct from the symmetries which are distinct from the symmetries generally associated with the questions injections).

J. Goophya. Ros., Blue, Paper 2A1971 Becent studies of wideband places wave data from the SER-1 and INEE-2 spaceraft have revealed that whistler made charms emissions in the Earth's outer magnateaphere are often acrompanied by high frequency bursts of electrostactic waves with a fraquancy slightly below the electrostactic waves with a fraquancy lightly below the electrostactic waves are modulated at the chorus frequency. Further studies using the places analyzer (LEPEDEA) data on INSE-1 indicate that these bersts are produced by a beam of electrost in Landau (longitudies); resonance with the chorus wave and thus moving at the chorus phase wellocity. A threshold exists in the chorus phase velocity. A threshold exists in the charts intensity below which the electrostatic bursts do not appear.

The high frequency electrostatic waves are believed to be caused by a type of two-atreas instability called the resistive-medium instability. The resistive-medium instability is characterized by a reduction in the electrostatic burst frequency below the electronadium instability. The instability is applicable only in the region of steep slope on the electron of lower by a the average thereal velocity of the beam and Vy is the average thereal velocity of the beam and Vy is the average thereal velocity of the beam and the proper troops. Our derivation assumes cold ions but were electrons. The instability requires landau danding to operate. Thus the beam velocity must be in the region of steep slope on the electron distribution function rather chan in the high velocity of the planne electron the region of a few humbed of V. The beam velocities in the observed cases were ~400 eV and ~500 eV, thus varifylog that the electrostatic bursts are in the proper region for the resistive-medium instability. (Chorus, Electrostatic bewes).

Landau trasonance).

J. Geophym. Res., Blum, Paper 2A1971

J. Goophya. Res., Blur, Paper 241973

5750 Pinema motion, convoction, or circulation DEPARTURE FROM CORDITATION OF THE ID PLASMA TORUS

D. H. Pontius. Jr. and T. W. Hill | both at Department of Space Physics and Astronomy. Rice University, Roustou, Tenas. 77251]

The departure of the Javian Engentraphure from rigid corotation is adequately explained by outward plasma transport at distances L. 2 10. The departure of R observed in the lo plasma borus, however, is too large to be accounted for alwely by plasma transport. We propose local plasma production to be the min factor determining the corotation lag in the torus. We calculate the nutward pick-up current provided by ionization of neutral atoms and relate this to the current produced in the lonesphere by the corotation lag. This leads to an expression giving the corotation lag of the torus as a function of radial distance. Charge transfer in found to be an important process, allowing the majority of the torus mass to be ojected from the majority of the torus asset to be ojected from the majority of the torus

S760 Plasms motion, convection, or circulation THE PPOBLEM OF COCKING THE COLD TO TOBUS John D. Richardson and George L. Since (Department of Atmospheric Sciences, University of California, los Angeles, California, 90024.

The cramsport of ions inward from lo's orbit is first modelied on the newsption that radial diffusion at the dominant transport mechanism and them modelied with a combination of diffusive and convective transport. Included in the model are thereal as well as number density transport, rediction, ionization and pickup of incol neutrals, recombination, charge exchange and Coulob interactions. Fure diffusive transport is capable of accounting for the dramptic inward depletion of the torus only by invoking recombination or by postulating a massive increase in the production rate of torus ions sometime prior to Voyager encounter. It is shown that radical time dependence (it is necessary to increase the source strangth by a factor of 2 20 before the arrival of Voyager cannot account simultaneously for the domaity and temporature observations. Similarly recombination is found to be much too slow to be the cause of the udinaved density ducrease inside of io. The model combining convection and diffusion can reasonably watch the data, but only with a diffusion coefficient limit 100 times loss than that the Temper derived diffusion cate combined with Voyager temperature and density masserments (apply a large non-realistive aink of energy in the inner torus.

I. Gouphyn. Rus., Blue, Papur 2A1931

1. Geophys. Rate, Blue, Paper 24,941

(7) to the off of Spacer rate statement of the Statement of Alabama, the off of Statement of the Statement of Alabama, the off of threshold energy dependence is shown for the charging of geostationary appeared in actipes. Applied Technology Satellite to and Place CSARA) data show that places the titues must octave the charging of most the titues must octave the charge in actipies. The extraction of a line should energy is apportionated above to love on those anti-titues to charge in ecipies. The extraction of a line should energy is apportionated above the power appoints a continue to the control of the state of the state of the state of the state of the charge of the continue to the state of the st I. Grophys. Rev., Blue, Paper Missou

Physical Properties of Rocks

hild Klasticity, fracture, and flow INVESTIGATION OF INTERNAL PRICTION IN YURED QUARTS, STEEL, LIGITY AND MESTRANAL PRICTION IN YURED QUARTS, STEEL, LIGITY AND MESTRANAL PRICTION IN YURED QUARTS, STEEL, LIGITY AND MESTRANAL ANGLITURE R.-F. LIU (U.S. Goological Europy, Monlo Park, California, 94075) and L. Pensinick
A detailed evaluation on the sathed of internal friction measurement by the strong-arrain hystoresis loop method from 0.01 to 1 Hz at 10-5 to 10-7 strain amplitude is presented. Significent systematic error in relative phase measurement car result from convex and surfaces of the sample and across sensor and from end-surface irregularities such as nicks and amparities. Froperation of concern advances policial to 20 policy amountment to 10 cm and 10 cm relative phase measurement to 10 cm relative phase measurement to 10 cm relative phase measurement to 10 cm relative phase measurements and 10 cm 1 - 0 cm 1 delay loop and 10 cm relative phase measurements and 10 cm 1 - 0 cm 1 delay loop and 10 cm 1 cm 10 cm 1 Measurly grants samila, where Q is the intercal friction of the fused quartz stress sensor under underfal compression. These values are consistent with those inferred from the relative modulus dispersion data also presented in this paper. The Lucits sample shows high values of internal friction $(Q_g^{-1} \sim 5 \times 10^{-2})$ with strong frequency dependence and with a saxiaum in Q_g^{-1} at ~ 0.4 Ma. J. Geophys. Ros., Red., Paper 281778

6110 Elasticity, fracture, and flow DEFORMATION OF SINGLE CRYSTAL CLINDPYNOXEMES: IN HEDEMBERSITE DISLOCATION - CONTROLLED FLOW PROCESSES IN HEDEMBERSITE J. J. Kolia and J. D. Blacic (Suophysics Group, ESS-3, Los Alamos National Laboratory, Los Alamos, New Mexico. 87545)

D. A. Kolla and J. D. Blacic (Seophysics actors Medical Los Alamos National Leboratory, Los Alamos, New Medical (87545)

Laboratory deformation experiments were carried cult on two single crystal clinopyroxenes, chrome dispaids and hadenbergite. The tests were made in a Grigosian dispaid in the single crystals were performed at strain pressure of 1000 megaposcals was applied in all the experiments. The crystals was applied in all the experiments. The crystals was applied in all the rates from 10-4 s⁻¹ to 10-8 s⁻¹ and at temperatures from 400°C to 1200°C.

Two orientations of the crystals with respect to the maximum principal compressive strass were tested in first orientation, subjects the 1000, 1001 and 6001 [100] mechanical twinning ayatems in clinopyroxene to high resolved shear stress in the sense appropriate for high resolved shear stress in the sense appropriate for subjects these systems to an equal resolved shear stress but in the opposite sense as that mechanical twinning to occur. The second orientation stress but in the opposite sense as that mechanical twinning is not possible. The effects of temperature and strain rate on the flow stress were observed for the two clinopyroxene compositions.

Rechanical twinning on the system (100), [001] was observed to be the primary deformation generature and strain rate dependent.

Crystals oriented favorably for twining aschanical segmentation for which sachanical segment in the dechanism of the primary deformation mechanical segment of the primary deformation of which sachanical segment of the primary deformation of which sachanical for which sachanical for the orientation for which sachanical

This thermally activated mechanism has an activation energy of 285 kj/mole (68 kcal/mole) and an activation area which expresses the effect of the applied stress on the total activation energy. This mechanism only operates at stresses above 520 MPs. At temperatures above 900°C and applied stresses less than 520 MPs flow in hedenbargite occurs by climb controlled dislocation glide. This leads to a thermally activated power law flow equation. The activation energy is 523 kj/mole (125 kcal/mole). Strain rate depends on the stress raised to the power 3.6.

The flow law derived for hedenbergite at high temperatures and low stresses may be extrapolated to a strain rate of 10-14 s-1 thought to be appropriate for flow in the mantle. This flow law predicts an equivalent viscosity of hedenbergite of 10⁴¹ poise at 800°C and 10⁴⁹ poise at 1200°C.

J. Geophys. Res., Red, Paper 281955

6110 Elasticity, fracture, and flow (Physical Properties of Rocks)
HICROCRACK STUDY OF GRAHITIC CORES PROM ILLINOIS DEEP BORREGLE UPH-3 5. J. Kowellis, H. F. Wang (Department of Geology and Geophysics, University of Wisconsin-Hadison, Madleon, Wisconsin 53706)

B. J. Kowellis, M. r. wang topartment of uselogy and Geophysics, University of Misconsin-Hadison, Medicon, Wisconsin-Sarok)

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J. Geophys. Res., Red. Paper 281956 6140 Magaetic and electrical proporties (Silicate

maits)
ELECTRICAL COMDUCTIVITY OF MOLTEM BASALT AND ANDESITE
TO 15 KILABARS PRESSURE; GEOPETSICAL SIGNIFICANCE AND
IMPLICATIONS FOR CHARGE TRANSPORT AND MELT STRUCTURE IN 25 KILMBARS PRESSURE; GEOFRIFICAL SIGNIFICANCE AND BUFLICATIONS FOR CRAMME TRANSPORT AND MELT STRUCTURE J.A. Tyburcsy (Department of Geology, University of Oregon, Engen, Oregon, 97405) and R.S. Waff Riestrical condectivities of motion Resetts and Estate Lake led its and Crates Lake andesits were measured between 1200°C and 1400°C at atmospheric pressure and at prestures up to 17 and 25 kilobars, respectively, Isobaric plots of log of vs. 1/T (o is clestrical conductivity) are limbar, with the exception of the morp pressure theletits melt data. Conductivities degrees with inscreasing pressure in both melts, with the andesitie melt exhibiting a greater pressure dependence. Setween 5 and 10 kbar abrupt degreeses in the slopes of isothermal log of vs. P plots (1.5. decreases in activation volume) are chastred for both rock melts. This dissontiautly probably refisers changes in main attentive, as opposed to changes in donduction mechanism. In each pressure range, the data for each rock melt can be described reasonably well by an equation of the form

 $a = a'_{\bullet} \exp \left[-\frac{\left(E_{n} + PAV'_{n} \right)}{kT} \right]$

where of is a preexponential constant, E is the autivation energy, and AV is the sortivation volume. A qualitative model involving depolymerization of the met with increased pressure leading to increased efficiency of paoling one applies the observed discontinuity in sortivation volume as well as the observed pressure depondences of other melt dysical properties such as visuosity and dessity. Conductivity versus melt fraction curves for partially molten peridottic are resvaluated using high pressure tholeities must required to describe and crystalline conductivity values recently determined by other verbars. Minimum melt fraction estimates of 3 to 10 per cent are required to caphin upper mentle regions of amountcourly high elsetrical conductivity in terms of a partial malting hypothesis. (Elsotrion) conductivity, high pressure. charge transport, melt atracture, high conductivity toos, upper mantle)

J. Geophys. Rea., Red. Paper 101881

J. Geophys. Res., Red, Paper 181883

6140 Megnetic and electrical properties
ON THE DEMAGNETIZING EMERGY AND DEMAGNETIZING FACTOR
OF A MULTIDOMAIN FERROMAGNETIC CIME
David J. Dunlop (Geophysics Leberatory, Department of
Physics, University of Toronto, Toronto, Comede MSS 147)
The equations E₂ = MJ² + const for demagnetizing
snergy and H₄ = -MJ for average internal demagnetizing
field (J is magnetization) is a demagnatizing factor,
assumed cometant) Are control to welt-domain (MD)
theories of thereoreasnence (TRH) and hysteresis.
Theoretical calculations reported hera, based on Rhodes
and Rowlends (1934) equations for E₂ of an MM cubu,
test the variation of N with the number n of domains
and with domain wall displacement x. For n even.
E₄(x) = R₄(0) is nearly proportional to x² or J², so
that H is practically constant (to a 20% if n = 2,
A 10% if n = 4 and by 5% if n = 8) for 0 s J s J₂. This
result coefficies the validity of traditional ND rock
tagnetic theories. However, if n is genil, N is signifleantly less than 4x/3 (the single-domain on n =
value); N ty 2 for n = 2 and (4x/1 - M) decreases as In,
an that N + 4x/1 when n = 8 or 10. Oratins with m odd
possess a sponteneous resements awen in the absence of
vall planing that is substantial (J, q 0.1 J₂) for n = 1
but decreases repidly for larger m. This sponteneous
resumance is a possible source of so-called pseudosingle-domain enhancement of TMH is seall PM grates.
(Rock magnetica, domain attructure, demagnetizing factor,
sponteneous resumance).

Geophys. Res. Lett., Paper 211822

Alfo Passo Changes
RECHAPISH OF OLIVINE TO SPINEL PEASE TRANSFORMATION IN
Missio,
J. H. Boland (Institute of Earth Sciences, State
University Passon Responsed to the Bata and Atla acess,
Memory, Revity, geoid varieties, Doppler measure—
ments),
J. Geophys. Res., Red, Paper 281734

meshaniam. Geophys. Res. Lett., Paper 2L1762

6190 Instruments and techniques
SEAR AND COMPRESSION WAVE HEASUREMENTS IN SHOCKED
FOLYCRISTALLINE A1203
Manua Park, Califor T. H. Gupta (SRI International, Henle Park, California

440(23) "Proc that international, Namio Park, California Experimental techniques have been developed to study the propagation of lerge amplitude, one disputional shear and compression waves to shocked solids of applitudes can be directly measured along with the usual measurements on logitudinal waves. Although shear wave amplitude measurements do not approach the quality of the compression wave data, shear wave than two parents. Experiments measurements to 90 kbsr. Compressive shock stresses are teported in Al.O. Within experimental scatter (£22), odr shear figure

velocity data are in good agreement with the extrapolation of the uirranomic measurements. The longitudinal measurements are in good agreement with earlier work. The experimental developments reported here are expected to be important to high pressure geophysics applications because they provide a direct measure of the shear modulus is not only a gore sensitive indicator of the solid state than the longitudinal modulus but in conjunction with the longitudinal wave data can provide the mean stress-volume relations for comperison with static data.

J. Goophys. Res., Red, Paper 281879

A. Geophys. Res., Red., Paper 281879

A199 General

Interpretation of Core and Wall Log Physical Property
Data from Brill Hole Upil-3, Stephenson Genery, Illinois
J. J. Penilss (USGS, Denver, CO 80225)

G. R. Olhosft (USGS, Denver, CO 80225)

J. H. Seact (USGS, Denver, CO 80225)

Latorical state of the general state of the season of the first of the root of the fortunian sensitivity manufaction of the fortunian sensitivity manufaction of the drill hole can be attributed to alteration of the ordinate overlying the grantee.

Practure somes can be identified from the south values, induced the season of the ordinate overlying the grantee.

Practure somes can be identified from the south values, induced the season of the form neutron values, is present in the depth interval from this fracture some. An unfractured region present from adopth of 1380 m to the bottom of the hole is characterized by an absance of physical property variation. The magnetic succeptibility and genue try measurements indicate a change in the amount of maffer warlations. The magnetic succeptibility and genue try measurements indicate a change in the amount of maffer core and the first of the fortiled interval from the security of the crystalization process of the soft or hay may be addicative of critical temperatures for specific mineral anaemblegen within the intrusive.

J. Geophys. Res., Red, Paper 20180

Planetology

6510 Armompheres of planets THE SATURN SPECTRUM IN THE EUV - SLECTRON EXCITED

only Accompanies of planes
THE SAITURN SPECTRUM IN THE EUV - ELECTRON EXCITED
HYDROGEN
D. E. Shemmasky (Center for Space Sciences, University
of Southert California, 3025 E. Ajo May, Tutson,
Arizons, 85713), and J. H. Ajello
Recent leboratory observations of electron excited
Hg in the EUV have brought about the realization that
higher Skyderg series hand systems make a significant
courtbution to the engsion spectrum. Theoretical
cross-section estimates for the excitation of the b.
D'. B'. B' states agree with these results. Model
calculations for partials excitation of the Saturn
atmosphere including the higher states now show
excellent agreement with Voyager surrors! and dayside
equatorial spectra. The used data size confirm the
relative apactral response calibration of the Voyager
inatrumnumics, providing a besis for acturate analysis
of the excitation processes on both Jupiter and
Saturn. (Hydrogen atmospheros, Saturn, electron
excitation). excitation).

J. Goophys. Res., Blue, Paper 241400

5375 Moon (Magnetic Fleid)
MAGNETIC DIPOLE MOMENT ESTIMATES FOR AN ANCIENT
LUNAR DYNAMO
K. A. Anderson (Physics Department and Space Sciences Laboratory,
University of California, Berkeley, CA 94720)
Ine four measured planoisty magnets, moments combined with a
recent theoretical prediction for dynamon magnetic fields waggests that no
dynamos exists in the Moon's tolerior today. For the Moon is have had a
magnetic moment in the past of sufficient strength to account for at leser
some of the hunar rock magnetism, the rotation would have been about
twenty ilmas faster than it is today and the radius of the fluid, conducting
com must have been about 750 km. The argument depends on the will
dity of the Bussa solution to the validity of the MND problem of plantlary dynamos.

l. Geophys. Res., Red, Paper 281419

65% Gross properties of planets
R. D. Respontong (Department of Earth and Planetary
Sciences, Massachusetts [netitots of Technology,
Combridge, Massachusetts 02179), and B. O. Bills
CRITIQUE OF "PLASTIC TRICKNESS OF THE VENUS LITHOSPHE
PROTHAPPED PROM TOPODRAPHY AND BRAVITY" BY A. CAZEMAVE
The PROMISE PRETHATED FROM TOPOURAPHY AND URAVITY BY A. CAZEMAYE AND K. DOMINE Cazemeve and Powlink [1981] compare the topography in a portion of the rolling plains province of Vonus with a measure of the corresponding gravity perturbations, the residual acceleration of the Ploneer Venus Orbitar. They ignore substantial gocachric factors and make unsubstantiated geophysical assumptions to draw consulusions which we committed logically invalid and cuserically implausible. (Vanus, gravity).

Cazemaye, A. and K. Doziah, Elastic Thickness of the Venus Lithosphere Entimeted from Topography and Gravity, Geophys. Res. Letters, 8, 1039-1042, 1981.

6530 Gross Properties of Planets
YENGS GRAVITY ANCHALIES AND THEIR CORRELATIONS WITH
TOFOGRAPHY
W. L. Bloggen (Jet Propulsion Laboratory,
A800 Cet Grove Drive, Pagedans, CA 9109), B. G. Bills,
P. W. Birkeland, P. B. Esponito, A. R. Konopliv,
R. A. Mottinger, S. J. Rithe
R. J. Phillips (Lunar and Planetery Institute,
Bouston, TX 77058)
This report pravides a summary of the high resolution
gravity data obtained from the Ploneer Vanus Orbiter
radio tracking data, Gravity maps, covering a 700
latitude band through 360 degrees of longitude, are
displayed as line-of-sight and vertical gravity.
Tapography converted to gravity and Bouguer gravity
maps are also shown in both systems. Topography to
gravity ratios size markedly different ratios for the

Miglo,
J. N. Rejand (Institute of Marth Sciences, State
University of Utrauht, 2508 TA Utracht, The
Matherisades, Rader C. Liebermann (Department of Earth
and Space Sciences, State University of New York, Stony
Brook, New York, 11794)
An electron microscope study of the civine to spicel
(transformation in MigBiog has revealed the nature of the
defact attuatures in the transforming clivine
insediately about of the migrating clivine-painel
interphans boundary. The residual clivine has a high
density of (100) and (0011 Burgacz-vector distocations
(it is 3 g 10° am²). No stanking facits or discocisted
although a significant number (-10° cm²) of (000)
dislocations are activated by the artrone synthesis
conditions (32 blur, 1)00°C). This result may have
important applications in the study of pelso-deformation
of clivine. The mechanism of the transformation in
fine-ground sample spears to be a machetions agrowth
process, with no avidence to support a mertansitic
seachions. (24 blur, 1)00°C). This result may have
supportant applications in the study of pelso-deformation
fine-ground sample spears to be a molecular part growth
process, with no avidence to support a mertansitic
secophys. Ras. Lett., Paper 2L1762

73:17c, northe 78527). Five are unique snorthosites considerably, Alkali snorthosites, particularly 1997c, are extremely rich is incompatible elements. The first snorthosite from Apollo 11 with manifestations of pristinity (10056a) appears to be a cormal emember of the ferrom group, Nowswer the first pristine ferrom anorthosites from Apollo 10 and 17 to be studied in debtil (1912c and 73217c) both new unusually sodio plugiculame by ferrom standards: With only 755 plagiculame by ferrom sample with less than .633 plagiculame. From sample with less than .633 plagiculame. The nature of the correlations between lumgiculame. The nature of the correlations between lumgiculame. The nature of the correlations between lumgiculame and So/Sm. Ti/Sm and Ge/Ms rablom, among prishine AMT samples has been calved dated, because five of the paw pristing samples are from sweatern site (Apollo 16). Interestingly, ferrom: americal 19312c has Ca/Ms. 30/Sm and Ti/Sm ratios cloge to the moreal ferrom wellows, but significantly displaced in the direction of the nonferroms western pristate rooms. This suggests that the composition-longitude relationships are se.old as the late atages of the dynatics rooms, the suggests that the composition-longitude relationships are se.old as the late atages of the dynatics room, anorthosites, ferrom anorthosites, ferrom anorthosites, sed fapar 291461

J. Geophys. Res., Red, Paper 281684

6370 Lunar Surface (Bracols Samples)
6370 Lunar Surface (Bracols Samples)
ROCK 67015: A FELDSPACHIC FRAGMENTAL SERCELA WITH
REEFP-RICH MELT CLASTS
U.S. Karvin (Sarvard-Smithsonian Center for
Astrophysics, 60 Garden St., Cambridge, Ma 02138) and
M. M. Lindetrom
Bracols 67015, one of the foldspathic fragmental
bracolses (FFBs) from the rim of Rorth Ray Crater,
contains a wider range of clast lithologies than has
been described proviously in FFB:— Our patrologic
and LHAA studies have revealed two components of
un jor patrologic and geologic significance. One of
these is a dark, vesicular, REEF-rich unit vock of
VRA (very high alumins) basalt composition, which
oncurs in clasts up to 6 cm long. Malt rooks of his
type are common at the Apolio 16 site, but in
previous years had not been discovered as promisent
conditiousnes of the faid-spathic fragmental breacian.
Their apparent sheance led to hypotheses, no longer
valid, that the REEFF well roofs were younger than
the anorthositic braceis marriess and that the two
lithologies might represent labrics and Macteria
alsoca, tamponively. The second lithology we
discovered in a large clast of medium-grained forman
anorthositic borthe vick a composition that falls
accog the most magnesism members of the farroon
anorthositic morthe vick a composition that falls
accog the most magnesism members of the farroon
anorthositic morthe vick a composition that falls
macriael constitutes a previously "sissing" member of
certain mixing models designed to account for the
Borth Ray Crater mait rocks and bulk bracciae.

J. Geophys. Res., Red, Faper 281664

6570 Surface of the Moun 6570 Surface of the Moun
THE LUMAP MEARSIDE HIGHLANDS: EVIDENCE OF RESURPACING
Constance G. Andre (Center for Earth and Plenerery
Studies, Unitonal Air and Space Passours, Washington DC
20500) and Princills L. Strain
Comparative fraquency distributions of aluminum,
magnesium, titanium, iron and choticu concentrations
from orbital geochonical data show a checical dichotomy
between the lunar mearside and latride torre surfaces.
Wasside terra rock types (indicated by nodes in the
histograms) are more angle and less aluminous than thome
on the far side. To explore this chemical asymmetry,
terra regions exhibiting other anonalousty high or low on the far side. To explore this chemical esymmetry terms regions exhibiting either anomalously high or low fig./al concentration rarios were examined. Low mg/al caretial excavated from depth by besin and large crator impacts lodicates that the highly "anorthositic" farming crustal composition to also prosent in the subturies of the east side at widely statured locations. Study of high mg/al areas of the hears led terms suggests resurfating of the precision terms suggests resurfating of the precision gretra, possibly by impact exactation to local nofic "poleta" in the crust or warly extrusion of volvants materials. (upbital goodhemetry, 2-tay llurrescence experiment).

6675 Surface of Planata

J. Geophys. Fem., Rol. Paper 28:682

RESPONSE TO DISCUSSION BY NUMBERAL, MASURSKY AND MAINGUET OF "ORIGIN OF MARTIAN CUTFLOW CHANNELS: THE FOLIAM MYPOTHESIS"

James A. Cutts and Karl R. Blasius, Planetary Science Institute Science Applications, Inc., Pasadana, (A 9110)

Many researchers now believe that wind has been an agest of "sacondary modification" of channels which were farmelly thought to be pristine fluvial Features.

These interpretations cast considerable coult us the workhological basis for a fluvial role in even the early stages of formation of these features. Outries channels can be sk-plained by the overprint of different geologic processes. Single process mechanisms such as fluvial activity are mether required nor supported by the photogeologic evidence.

J. Geophys. Res., Red. Paper 281502

nor supported by the photogeningic avidence.

J. Geophys. Rem., Red. Paper 28(562

CRYSE BASIN (HANNELS: LON-GRADIENTS AND PONDED FLOWS B. K. Lucchitte and K. M. Ferguson (U.S. Geological Survey, 2255 N. Genini Dr., Flagstaff, AZ 66001)

Gradients on the floors of the martian outflow channels that are derived from elevation profiles across Lunse Planum and the Chryse Basin are much lower than those obtained from the U.S. Geological Survey's lopographic map. To arrive at this conclusion, 26 radar-elevation profiles clustered at four latitudinal channel crossings were analyzed and approximate longitudinal gradients of the channel floors were constructed, thereas, the gradients of Maja and Ares Valles are stailer to those of the catastrophic flood channels in the Scablands of Mashington State, and water or ice could have moved through them without difficulty, the gradients of Stmad and its Valles are essentially level, and the movement of fluids to the north posas problems. It is proposed that ponding from local runoff occurred before channel formation elong the course of Slaud and I'u Valles. The ponding may have formed lates in depressions associated with the Valles Mariner's grabans, ancient creters in the chaotic terrain area, and possibly even the regional low where rost chaotic terrains occur. It is any sinned that lakes eventually overflowed, drainages became integrated, and headward erosi one breached interflues, thus forming the present channel configurations. When damp troke, floods, modifious, or mixtures of water, sediments and ice were released catastrophically, with a final gigantic flood from the Valles Herineria aystes of troughs. This flood would have had sufficient head to move fluids through mearly level gradients through the Simula and Tiu chanples. The ponding and flooding probably occurred during a time when the climate was different than at present, permitting surface or planes.

6575 Surface of planets
DITACT EXPERIENTS ON ICE
S. Kawakami (Department of Earth Science, Sagoya
University, Magoya 464, Lapen), H. Minutani, Y. Takagi,
H. Kaco, and H. Eupaneses
The Tesuits of cratering and fragmentation

The results of cratering and fragmentation apperiments on pure ice are resported. The projectiles used are cylindrical simulants, poly-carhonets, teflon and pyrophyllite fired at velocities between 110 m/sec and 680 m/sec, with kinetis energies at impact between 2 and 300 joules. Crater diseasters (pit diseasters) in the 10e were shout two times larger than oraters in the same energy range in heasits. The ratios of (pit diseaster)/(spail diseaster)/(spail diseaster)/(spail diseaster) are between 0.1 and 0.1 which are close to the depth/diseaster in ice is also well appeared as a single function of the late-arage effective energy defined recently by Hixutani et al. [1982s]. The spacific energy for complate destruction of ice target is about 50.1/kg which is two orders of magnitude smaller than that of heasit. The present experimental data on cratering and fragmentation of ice above the the impacts ensorited with the largest craters on Califiate and Rissas must have envariely fractured the whole satellites, and that those glant impacts with the kinguic energy of 10% to 10% joules pytholy stream in fragmentation, for, lay satellites. (Crater, fragmentation, fice, lay satellites). J. Gaophys. Hes., Red, Paper 251775

6575 Surface of Fluncts
INFACT OF AM ASTENDID OF CORFT IN THE OCEAN AND
EXTENCIOUS OF TRRESTRIAL LIFE.

1. Ahrane and J. D. O'Kenfa (Sulmological
Laboratory, California Daritute of Technology,
Passanda, Chiffornia, 91125)
Finite difference calculations describing the impact
smohanics associated with a 10. to 30 in dimenter
pilicate or water object topacting a 1 km deep ocean
overlying a milicate solid planet at 30 km/mer
demonstrate that from 12 to 13% of the boilds duergy

6500 Meteoritic

NICCLEAR TRACK AND COMPOSITIONAL STUDIES OF OLIVINES IN C
AND CM CHONDRITES

I N Grassam (Periods Research Laboratory, Abmoshbad-180009, Indial and
I D Miscologial

A small fraction of the olivines in Cl and CM chondities contain solur flare
tracks These as no major compositional differences between the irraduced and
nonbraduated colvines, reagening that they forms single population. Soon flow
signant a single aggregates and directions are located politics from
signant a single aggregate and directions in the control good in the control of the control o

J. Geophys. Res., Red, Paper 28162)

16375 Surfaces of Planets THE STABILITY OF GROUND ICE IN THE EQUATORIAL REGION OF

THE STABILITY OF GROUND ICE IN THE EQUATORIAL REGION OF WARS

S. H. Clifford (Dept. of Physics and Astronomy, Univ. of Nussachusetts, Amherst, Na 0,0003) and D. Rillei.

Consideration of the partial pressure of H₂O in the Nurtiem atmosphere and the range of man annual temperatures at the Martien surface, suggests that the occurrance of ground ico in equilibrium with the atmosphere is restricted to latitudes poleward of -40°. However, there is a growing body of norphologic swidence which indicates that substantial quantities of ground ice may have been present in the equatorial regolith throughout Astrian geologic time. The accepted suplantion for this apparent contradiction has been that the H₁O found near the equator is a realic, emplaced very early in Martian geologic history (D.1.5 billion years ago) and under substantially different climatic conditions. It is generally believed that this fossil ground ico layer has been preserved to the Present day by the diffusion limiting properties of a relatively shallow layer (old meters) of fine-grained regolith. To evaluate this hypothesis, the lifetime of a 200 meters layer of ground ica, buried below 100 neters of ice-free regolith, has been examined for the latitudes between 100 on Nets. Theire model, pore size distributions, representative of silt and disy-type soils found on Earth, were selected to simulate the pore structure of the Serial regolith. The peralial pore model of gameous diffusion was then used to calculate the flux of example, has molecules from the buried ground ice layer. The potential offects of such factors and depth of buriel, the martian goothermal grainer, expolith, promitive, adsorption, surface diffusion, and climatic charge, were also considered. Based on our enalysis, the most important factors affecting the substitute of the example of the regolith, we exceed the substitute of the special grainer, and litithe climatic dosorption of Obj. from the regolith, we exceed the substitute of the special part of the conditions recovery for th

.f. Geophys. Res., Red. Paper 281912

6575 Surfaces of Planets
THE GEOLOGY OF TERRYS
J.M. Moore and J.L. Abere (Sabool of Geology and
Geologyatos, University of Polishons, Vorman, OK 73519)
The marface of the Saturnian equalitie Tathys has
been recognized to comment of four asjor landforms or
physicographic provinces: nilly graterial terrain. The
Odysmans impact structure, rifts and lineacents
(including Ithmos Chasses), and plains terrain. Two
alternate geometrion for the geological evolution of the
satellite are developed. The first codel assumes that
thmos Tessas and the other rifts and lineacents were
created by the Odysmans impact event. The second codel
assumes that rifting was a result of the freezearparation of Tethys' liquid water interior. In both
codels, the hilly createred terrain is postulated to be
the oldest unit and the plains terrain, the youngest.
J. Geophys. Ram., Ref. Paper 181701 12713

J. Gmophys. Raw., Red, Paper 28170)

J. Gaophys. Ras., Red. Paper 181701 12/13

6599 General (Impact Craters)
AGOUSTIC FIDIDIZATION AND THE BUALL DEPRHENCE OF IMPACT CHARES MAPPHOLOUT

H.J. Heloch Choser and Planacary Lab, University of Arisons, Tucson, At 85711) and E.S. Gaffrey
A phenomenological Singhem plastic model has praviously been above to provide an adequate description of the colleges of impact craters. This paper demonstrates that the Singhem peranters may be derived from a model is which accustic energy generated during excavation fluidites the took debris entropology the crater. Emperisantal support for the theoratical flow law is presented. Although the Binghem yield extense cannot be computed without detailed knowledge of the initial accusate field, the Binghem visionally is derived from a nimple may make the best of crater dissect, consistent with cheavation. Crater dissect, consistent with observation. Crater deleges may occur in material with internal dissipation Q as low as 100, comperable to laboratory observations of the regenerated during flow. Cortered, Multiring Essina, Impact, Fluidissinal.

J. Geophys. Kas., Red., Paper 281062

J. Geophys. Kam., Red, Paper 251,662

J. Geophys. Res., Sine, Paper 2A1729

6599 General or miscellaneous SUPPLY OF SO₂ FOR THE AIRDSPHERE OF Io L. J. Lanzerotti and W. L. Brown (Bell Laboratories, Murray Hill, N. J. 07974) We point out that in addition to a vapor pressure equilibrium source for SO₂ in an atmosphere of Io. equitibrium source for SO₂ in an atmosphere of Io, recard inhoratory sputtering results combined with Yoyagor-measured particle fluxes, indicate that SO₂ could result from charged particle erosion of frost deposits on the satellite's surface. On the hightside, and for dayside fromt patthes where the temperature may be glOV 6, such erosion will be a dominant mechanism. (Satellite surface, sputtering, Jupiter mechanism. (Satellite surface, sputtering, Jupiter meanetsonberg).

6399 General (Cratering)
CRATER EJECTA SCALING LAWS: FUNDAMENTAL FORMS
BASED ON OMBENSIONAL ANALYSIS
K. R. Housen (Boeing Aerospace Co., MS 13-70, Scattle, WA,
98124), R. M. Schmidt and K. A. Hoisappie.
A model of crater ejecta is constructed using dimensional
analysis and a recently developed theory of energy and
momentum coupling in cratering events, Sceneral relationships
are derived that provide a rationale for scaling laboratory
measuraments of ejecta to larger events, Specific expressions,
are presented for ejection valocities and ejecta blanket
profiles in two limiting regimes for an ejection, Le., the
so-called gravity and atwangin regimes. In the gravity regime,
ejecta valocities at geometrically similar launch points within
craters vary as the square root of the product of crater redius
and gravity. This relationship implies geometric similarity of
ejecta blankets. That is, the titickness of an ejecta blanket as
a function of distance from the crater center is the same for
all sizes of craters all the thickness and range are expressed in
terms of crater saids, but the trangit regime, ejecta velocities
are independent of crater size. Consequently, ejecta blankets
are not geometrically similar in this regime.
For points sway from the crater rain the expressions for
ejecta velocities and thickness take the form of power-laws.
The exponents in these power laws are functions of an
exponent, q., that appears in crater radius scaling
relationships for ejects. Predicted ejection, velocities and
ejecta-blanket profiles, based on measured where of C., are
compared to existing quashurements of velocities and celetia
profiles, (impact cratering, ejecta, dimensional analysis).
J., Geophys. Size., 'Sed, 'Espec' 281702